SERVICE DATA
FILE NO. 130-076

TOSHIBA

DIRECT DRIVE RECORD PLAYER

SR-510C

SPECIFICATIONS

PHONOMOTOR AND TURNTABLE

Motor:	Direct drive AC servo-motor
Speed:	33-1/3, 45 r.p.m. (2 speeds)
Speed adjustable range:	Within ± 4%, independent adjustment for 33-1/3 and 45 r.p.m.
Wow and Flutter:	Less than 0.03% (WRMS)
S/N ratio:	Better than 60 dB
Turntable:	300mm ϕ (Almi-diecast), 1.2Kg

TONE ARM

Type:	Static-balance system, S-shaped
Effective length:	237 mm
Tracking error:	+1.5°, -0.5°
Overhang:	15 mm
Range of stylus pressure:	0 - 4g

CARTRIDGE

Model:	C-404SY
Type:	Electret condenser type
Frequency range:	20 - 50,000Hz
Output voltage:	30 mV
Separation:	25 dB (1kHz), 15 dB (30kHz)
Channel balance:	1 dB (1kHz)
Compliance:	15 x 10^{-6} cm/dyne (100Hz)
Range of stylus pressure:	1.5 ± 0.5g
Stylus:	N-404SY
Cantilever:	Aluminum alloy taper pipe
Stylus tip:	Extended stylus, diamond
Weight:	6.5g
Output terminal:	1.0 ϕ, 4 pin (EIA standard)
Span of fitting screws:	12.7 mm

POWER SOURCE AND OTHERS

Power source:	110/120/220/240V, 50/60Hz
Power consumption:	14W
AUX output:	500mV
Dimensions:	550(W) x 414(D) x 190(H) mm
Total weight:	12.5 Kg

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FEATURES

■ **High Performance CC Cartridge:**

This Model adopts a high performance CC (electret condenser) cartridge, which has excellent frequency and few transient distortion. And characteristic of high frequency is much better than other cartridges.
Furthermore, by the use of the extended stylus, it is expected that the disc is less damaged as compared with the use of a round shape stylus or an elliptic one. So this model is most suitable for playing the 4 channel (CD-4) record.

■ **Direct Drive System:**

The direct drive system is the one in which the turntable is directly coupled with the motor. It performs with excellent efficiency as compared with standard systems, and efficiency is guaranteed for a long period.

wow and flutter:	less than 0.03%
S/N ratio:	better than 60 dB

■ **Speed Change by Touch Coversion System:**

A fingertip touch of a button activates an electric circuit to effect a sure speed change.

■ **Adoption of Electric Brake:**

Speed change can be accomplished faster than any other standard direct drive system players; with the adoption of the electric brake, precise revolution speed is obtained.

■ **Revolution Indicator Lamp:**

Revolution speed is indicated with a strobo, as in the standard direct drive system; in addition, with adoption of the revolution indicator lamp, adjustment can be made easily by observing the lamp.

■ **Arm Elevation Mechanism Avoids Damage to Stylus:**

The arm elevation mechanism can be used for both raising and lowering the arm. Lever operation lets the cartridge stylus tip descend softly onto record to protect both record and needle.

■ **45-Adapter with Overhang Gauge:**

In case of cartridge replacement, fitting and adjustment can be easily done by inserting 45-adapter in center shaft, taking the arm head there and aligning stylus tip with mark on the adapter.

1. OPERATING INSTRUCTIONS

1-1 FRONT VIEW

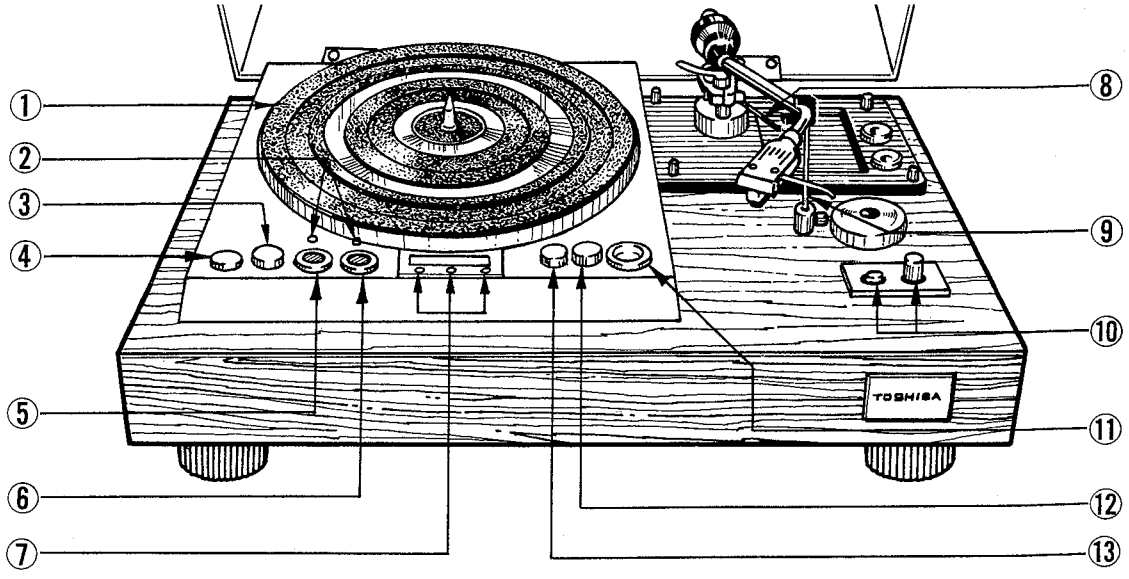


Figure 1

①	Turntable	⑧	Arm lift lever
②	Rotational speed indicator lamps	⑨	Arm rest
③	Stop button	⑩	CC/MAG cartridge selector switch
④	Start button	⑪	Level
⑤	Speed change-over button(33 r.p.m.)	⑫	Speed adjusting knob (for 45 r.p.m.)
⑥	Speed change-over button (45 r.p.m.)	⑬	Speed adjusting knob (for 33 r.p.m.)
⑦	Speed indicator lamps		

1-2 BACK VIEW

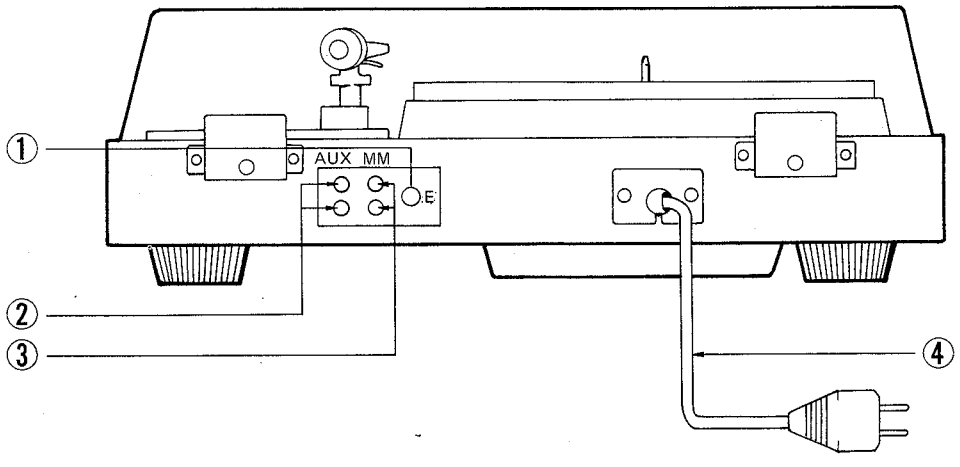


Figure 2

①	E (Grounding terminal)	③	MM jack
②	AUX jack	④	AC power cord

2. OPERATIONS

2-1 ASSEMBLY PROCEDURE

a) Taking the player out of the packing box, remove two transit screws 1 which fix transformer and strip 2 which fixes arm. Next, take out turntable 3, turntable sheet 4, and dust cover 5 from another package. Then, assemble cartridge 6 and counter weight 7 to the tone arm which will be found in accessory box [figure 3].

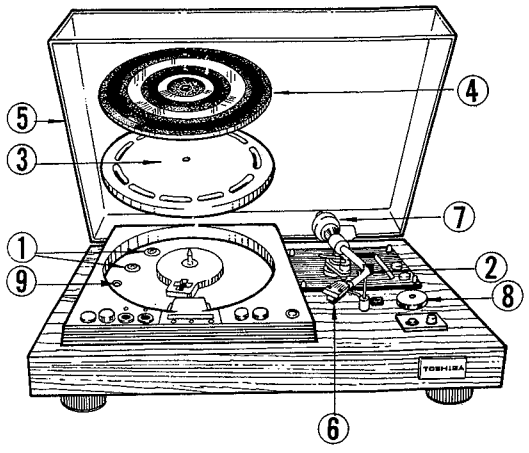


Figure 3

① Transit screws	⑤ Dust-cover
② Tone arm fixing strip	⑥ Cartridge
③ Turntable	⑦ Counterweight
④ Turntable sheet	⑧ 45 adapter
	⑨ Voltage select

b) Cable connections

- Connect the SR-510C and your amplifier as follows.
  (1) AUX output: connects to AUX input of amplifier (in case that the cartridge is condenser cartridge).
  (2) MM output: connects to PHONO input of amplifier (in case that the cartridge is magnetic cartridge).

  Push the "MAGNETIC CARTRIDGE" button or "CONDENSER CARTRIDGE" button of the cartridge selector switch, according to the mounted cartridge.

- Playing the CD-4 (4-channel) record

  Connect the SR-510C and Toshiba 4-channel demodulator SY-504 as follows.
  (1) MM output: connects to MM input of SY-504 (in case that the cartridge is magnetic cartridge).
  (2) AUX output: connects to CC input of SY-504 (in case that the cartridge is condenser cartridge).

  Push the "MAGNETIC CARTRIDGE" button of the cartridge selector switch of the SR-510C regardless of mounted cartridge.

2-2 EXCHANGE OF CARTRIDGE

When the cartridge (incl. headshell) is interchanged, tune to the minimum volume position on your amplifier.

(1) Next, exchange the cartridges. Figure 4 illustrates the method for removing. To replace cartridge follow in reverse order (figure 4).

(2) Adjust the stylus pressure upon finishing the cartridge replacement.

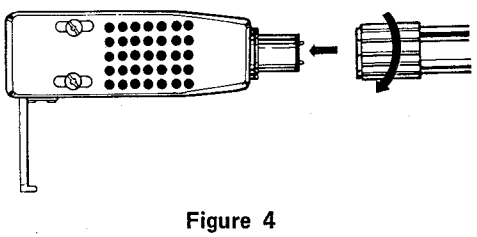


Figure 4

2-3 EXCHANGE OF STYLUS

Life of the stylus N-404SY attached on the cartridge C-404SY is approximately 300 hours, and longer use of it may result,not only in having considerable distortion,but also in damage to the record. You had better replace it with a new one at the earliest possible time after 300 hours. Exchange of a stylus can be done as shown in illustration (figure 5). That is, take off a fitting screw, then pull out the stylus to the arrow direction, and you can mount a new one in reverse way.

(NOTE)

As the cartridge attached has a slide-way stylus protection cover, do not remove the cover away, but slide it to the arrow direction (figure 6) whenever playing the disk or adjusting stylus forces.

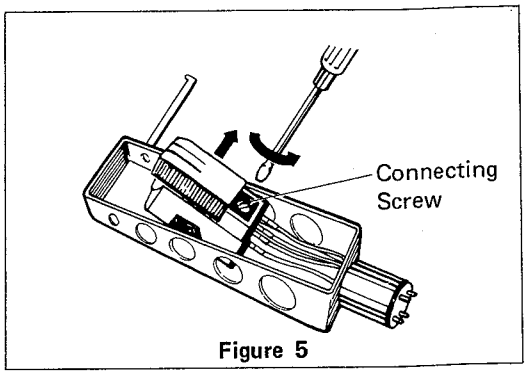


Figure 5

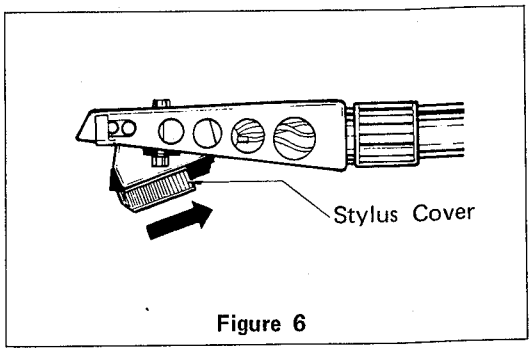


Figure 6

3. DISASSEMBLY INSTRUCTIONS

3-1 BACK COVER REMOVAL (Figure 7)

a) Remove the dust cover, turntable sheet and turntable.

b) Remove the four legs and the three mounting screws marked (★) from the COVER-AMP.

c) Remove the fifteen mounting screws marked (※) from the BACK COVER. Then, remove the four mounting screws marked (★★) from the COVER-BOTTOM. (See Figure 8.)

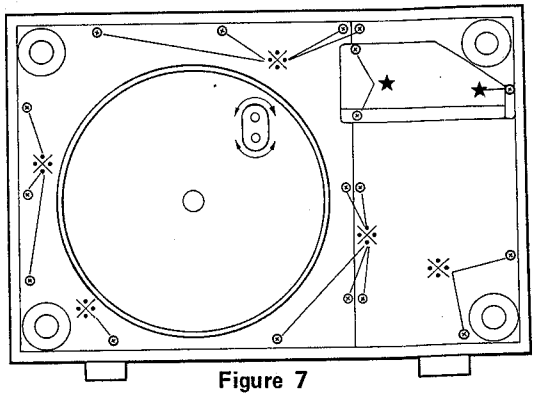


Figure 7

3-2 THE CABINET REMOVAL (Figure 8)

Remove the two screws from the power cord holder and then pass the power cord with the power cord holder through the hole. Then, remove the four mounting screws marked (*) from the cabinet.

Be sure to hold the panel before removing all of the four screws marked (*).

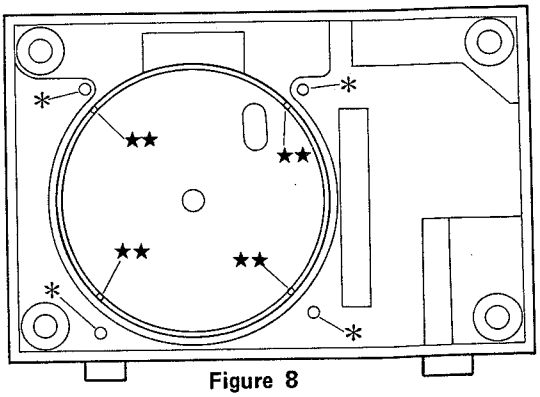


Figure 8

4. ADJUSTMENT OF MAIN PARTS

4-1 HOW TO GET A CORRECT ROTATION RATE

There are two ways to adjust the turntable speed correctly. One is by watching stroboscope and the other is by watching indicator lamp. (Do it 30 – 60 seconds after switching on – thereby more accuracy can be obtained.) In case of using the stroboscope you can expect most accurate speed. However, in case you adjust the speed with an aid of speed indicator lamp, you can also expect accuracy of speed within 1% error. To adjust the speed by the aid of stroboscope, peep the stroboscope window and turn speed adjusting knob clockwise or counterclockwise until you find a steady pattern in it. When the pattern is seen moving to the left, it means fast speed, (turn the knob clockwise) and to the right means slow. (turn the knob counter-clockwise.)

The speed adjustments on 33-1/3 r.p.m. and 45 r.p.m. are done separately not to affecting each other.

In case you adjust the speed by the aid of speed indicator, "Green" and "Red" lamps are provided. The green means right speed. When the red is turned on, adjust the speed adjusting knob so that the green may light. The speeds will be changed by the speed adjusting knob in the range of between +4% and -4%.

4-2 HOW TO DETERMINE THE ARM OVERHANG (Figure 9 and Figure 10)

The arm overhang is factory adjusted. But in case you change the cartridges, adjust the overhang as follows. Mount the 45 r.p.m. adapter on the turntable, then bring the cartridge mounted in the arm to the top of the 45 r.p.m. adapter. Adjust the cartridge position by loosening the adjusting screw so that the stylus point comes to the overhang adjusting line on the top of the 45 r.p.m. adapter. The accurate arm overhang is 15 mm from the center spindle. Fasten the overhang adjusting screw after adjustment.

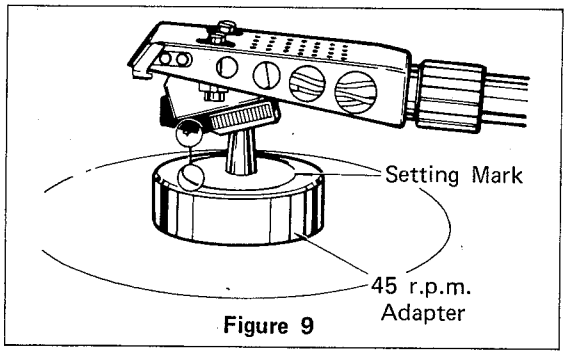


Figure 9

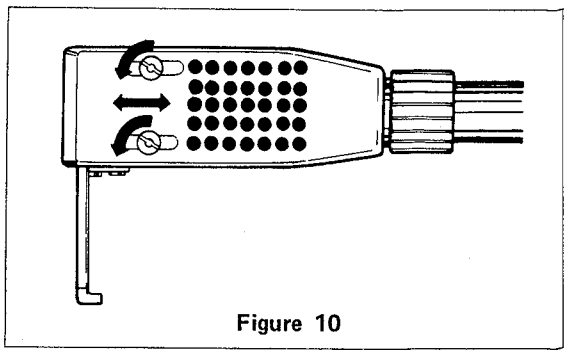


Figure 10

4-3 ADJUSTMENT OF STYLUS PRESSURE

Set the stylus pressure dial ring in 0.

Balance the arm loaded with cartridge in horizontal level by sliding the counterweight as shown in figure 11.

Next, turn round the dial ring up to a designated graduation (1.5g). This highly efficient arm can measure the stylus pressure from 0g to 4g at the unit of every 0.25g.

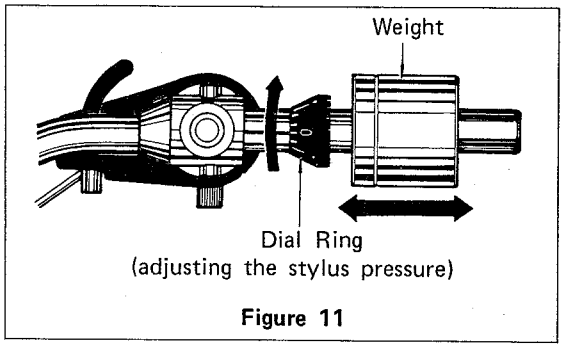


Figure 11

4-4 ADJUSTMENT OF THE ARM HEIGHT

The arm height is factory adjusted. When the cartridges are exchanged adjust the arm height by lifting the arm shaft slightly higher than the arm becoming level in case of a disc playing (Figure 12). For this, adjust it by loosening three screws in order as in 1, 2 and 3. After adjustment, these screws must be tightened again.

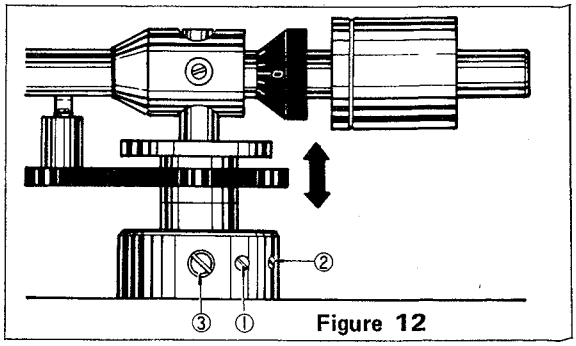


Figure 12

5. ALIGNMENT INSTRUCTIONS

5-1 OPERATING PRINCIPLE

1. Characteristics of Direct Drive Servo-Motor

This motor differs from the standard belt drive and idler drive motor, in that it has no mechanical transmission of revolution. It drives the turntable directly. There are many outstanding features of this type of motor:

1. Signal/Noise (S/N) ratio is good.
2. Long playing life.
3. Sudden stops impose no strain upon mechanism.

Further Characteristics;

4. Since there is a brake for varying revolution speed, the speed can be changed swiftly from 45 r.p.m. to 33 r.p.m.
5. With the speed indicator lamp in use (except for Strobo indication), fine r.p.m. adjustment can be easily accomplished.

2. Structure of Motor (Figure 13)

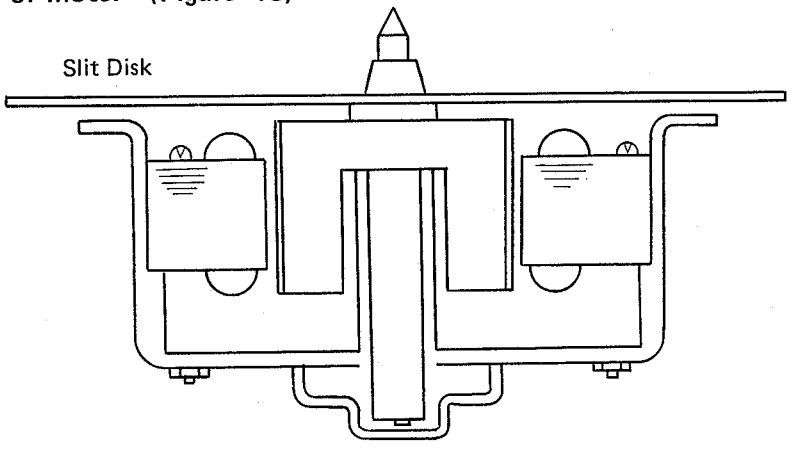


Figure 13

3. Operating Principle of Revolution Control

This motor is an A.C. (Alternating Current), 4 pole, 16 slot, single phase induction motor. Differing from the standard A.C. motor used in belt drive phonographs, this motor has the characteristics of changing its revolution remarkably by means of voltage, load, or torque. (refer to Fig. 14).

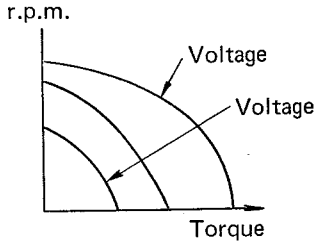


Figure 14

In this feature, the revolution control circuit consists of electronic circuit changing automatically the supply voltage to the motor, to keep the turntable revolution constant. In order to control the A.C. motor by electronics system, current circulating in the motor is fed to the collector of the transistor through diode bridge circuit, and Condenser Collector current which controls current circulating in the motor is controled by V_B added to base (refer to Fig. 15). Refer to Fig. 16 for block diagram consisting of control circuit.

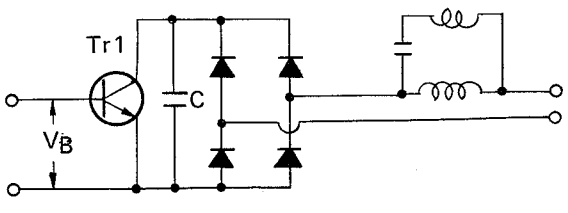


Figure 15

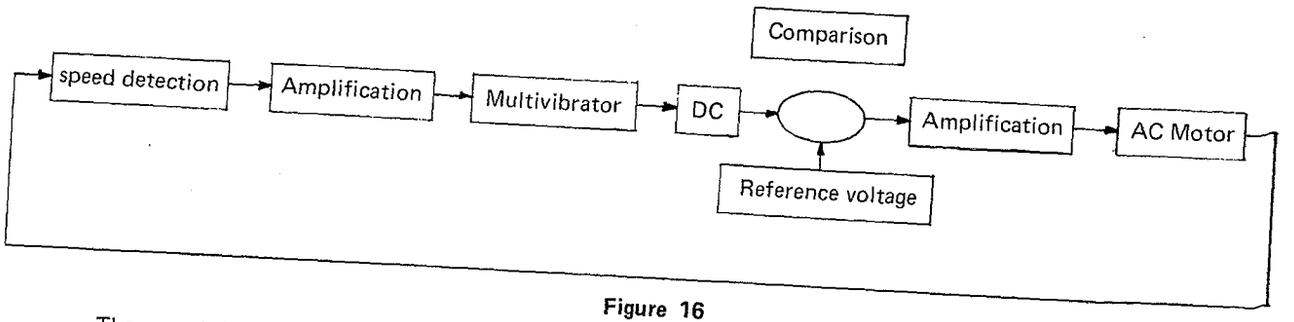


Figure 16

The speed detector monitors the speed, and when turntable revolution speed, for some reason, becomes higher than the preset value, the detector decreases the motor voltage to reduce the speed, or, in case of lower speed, increases it by amplification, so as to maintain constant revolution speed.

Speed Detector

The speed detector consists of lamp, slit board A fixed on the axis of Motor, slit board B and CdS (Photo-electric transducer) as shown in Fig. 17.

The lamp light passes through two slit boards (A, B) and the revolution of slit board A is translated into the intermittent speed of the light, which is converted to CdS resistance change. Turntable speed diviations in either direction are detected as voltage change across CdS.

There are 150 slits in the slit board A. When the speed of the turntable is 33-1/3 r.p.m., the amount of alternative signal is obtained according to the formular mentioned below.

$$(33 + 1/3) \times 1/60 \times 150\text{Hz} = 82.79\text{Hz}$$

When the flicker through only one slit is applied to the CdS to detect the speed, wow flutter is generated by slit scatter. Therefore, the light flicker through three slits is used to enable the detector to override the scatter.

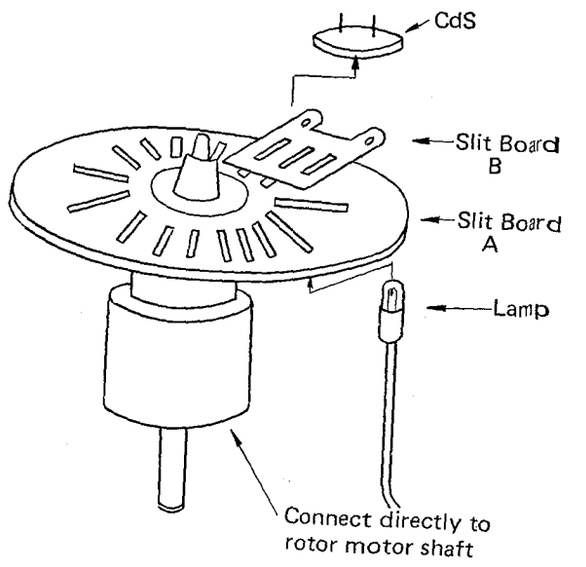


Figure 17

Amplifier, Multivibrator

The alternation signal voltage from the speed detector is saturation-amplified into a pulse wave. Then, in spite of the scatter of light and darkness through the slit, the pulse wave becomes constant. This pulse wave passes through a differential circuit to act as the trigger, which oscillates a mono-stable multivibrator and obtains a fine pulse wave whose frequency is the same as that of the alternation signal from the speed detector.

Direct Current

The positive portion of the pulse wave passes through the integral circuit and direct current is obtained. With low turntable revolution speed, this direct current is large; with high revolution speed, it is small.

Standard Voltage

Stabilized direct current source.

Comparison, Amplifier

Direct current from the integral circuit is compared with standard level, and the difference is amplified. The amplified signal is supplied to the transistor whereby the motor control controls motor revolution. In this way, the motor current is adjusted to stabilize the turntable revolution speed.

4. Operating Principle of r.p.m. Adjust Switch

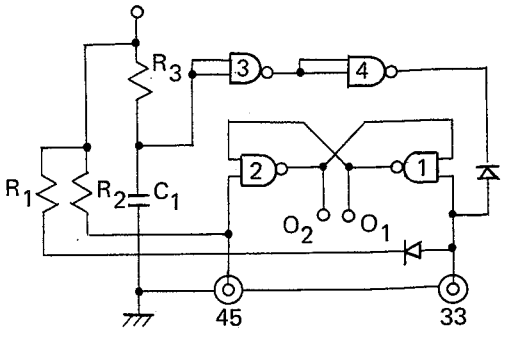


Figure 18

Figure 18 is the diagram of the operating principle of the r.p.m. adjust switch.

(1), (2), (3), (4) are a NAND GATE, integrated to Integrated Circuit TC7400P and (1), (2) comprise the flip-flop.

(3), (4) and R_3, C_1 are the preference circuit which maintains 33-1/3 r.p.m. speed when power switch is ON.

When power switch is turned ON, the input of (3) is "0" until C_1 is charged through R_3 from V_{DD}, and according to the Truth Value Table, the output of (3) (that is the input of (4)) is "1" and output of (4) is "0".

Therefore, the input of (1) is "0", "0" output "1" (the input of (2) is "0", output "1".) input of (2) is "1", "1" output "0" to end up stable. Taking $0_1 = 1$, $0_2 = 0$, transistors switch on the 33-1/3 r.p.m. indicator lamp and change the motor revolution. Next, when the 45 r.p.m. touch button is activated, the input of (2) is grounded through finger skin resistance to become "0" and input of (2) is "0""1" output "1", input of (1) is "1" "1" output "0".

HAND GATE (Truth Value Table)

Input a	Input b	Output
0	0	1
0	1	1
1	0	1
1	1	0

Figure 19

Therefore, $0_1 = 0$, $0_2 = 1$, flip-flop changes to reverse, and as with the 33 r.p.m., transistors switch on the 45 r.p.m. indicator lamp and change the motor revolution speeds.

5. Circuit Operating Principle of Revolution (Speed Deflection) Indicator Lamp

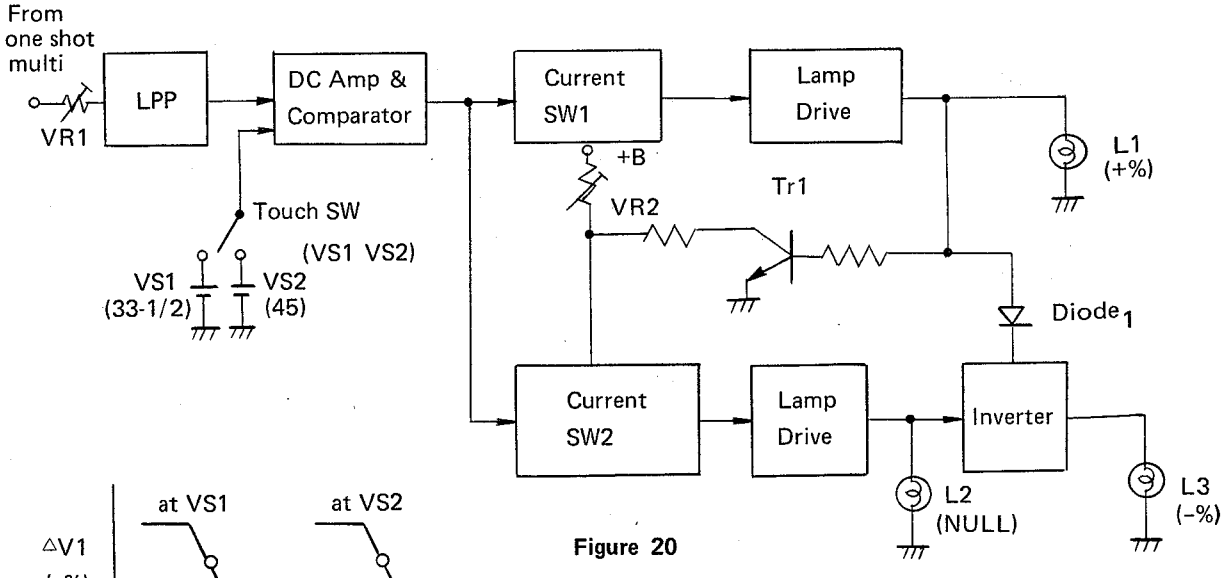


Figure 20

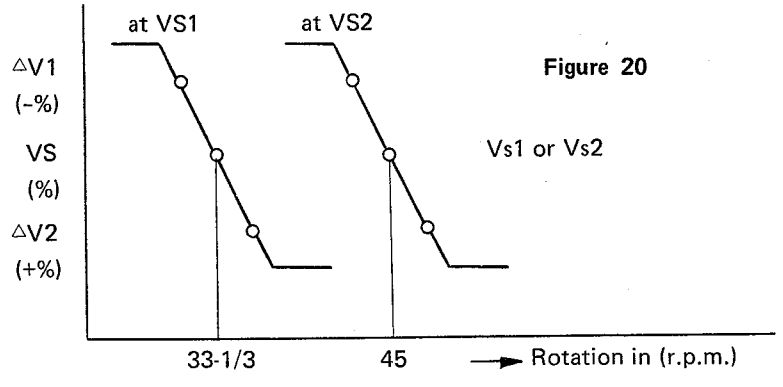


Figure 21

In Fig.20, the output from the one shot multi is adjusted at VR_1 and translated into D.C through LPP to be the input of the Comparator.
This signal is compared with VS_1, VS_2 and the D.C part is amplified.
This output, which is the reverse phase of input, is added to the current of SW_1, SW_2 and only when the output exceeds the each preset voltage, they turns "ON" to switch on each lamp.
The explanation of switch over sequence of each lamp is as follows: when the turntable revolution is much lower than the normal revolution (33-1/3 or 45 r.p.m.), comparator voltage output is high, and current SW_1, SW_2 are in "OFF" condition, therefore only L_3 lights. As the revolution speed increases, comparator output decreases directly, as in Fig. 21, when it reaches $\triangle V_1$, current SW_2 turns "ON" to switch on L_2 and switch off L_3.
Current SW_1, which does not reach the preset voltage, maintains its "OFF" condition.
When the revolution speed increases further and the comparator output becomes to $\triangle V_2$, current SW_1 turns "ON" to switch on L_1. At this time, as the voltage V_{CC} is added to L_1 from both sides, Tr_1 turns "ON" and set voltage of current SW_2 decreases to "OFF", switching off L_2. At this time, the bias is added to the inverter by D_1 and L_3 does not light.
In this way, any increase or decrease in the revolution speed is indicated on the border of $\triangle V_1$, $\triangle V_2$ (±1%), and in their central ranges, normal revolution speed can be indicated to an accuracy of ±1%.

6. Operating Principle of Brake Circuit

This circuit operates the brake in order to quickly reduce the revolution speed when the turntable revolution is changed from 45 r.p.m. to 33-1/3 r.p.m. Standard voltage is about 7.4V at 33-1/3 r.p.m. and about 6V at 45 r.p.m.; use is made of this voltage difference: when revolution speed is changed from 45 r.p.m. to 33-1/3 r.p.m. a relay is operated within a constant time. This relay changes the motor winding and supplies auxiliary coil voltage for reverse revolution in order to swiftly reduce revolution speed to 33 r.p.m., and then the relay operation ends.
At this time, since the transistor for motor control is "OFF", true revolution power is not activated. When relay operation continues for a long period, and the transistor for motor control turns "ON", phase advancing condenser C is grounded and reverse revolution power is lost. Then, only a small amount of true revolution power is generated. Resistance R is for the protection of the relay contactor.

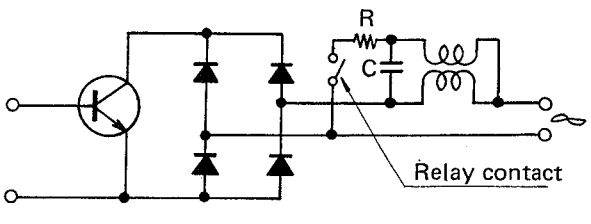


Figure 22

7. Protection Circuit for Revolution Control Lamp Disconnection

This protection circuit prevents high speed revolution, when revolution control lamp is disconnected and control power is lost.
In this state, neither true revolution nor reverse revolution can be achieved.
When lamp is lighted, a certain voltage is generated by resistance R and the control circuit and brake circuit operate correctly without adjustment.

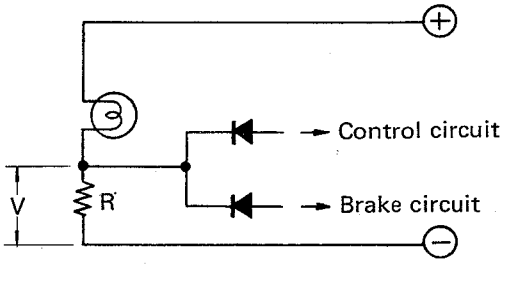


Figure 23

At this time, although the voltage sent to the lamp decreases and light is feeble, revolution control is unaffected and the lamp life is increased.
When the lamp circuit is disconnected, voltage to resistance R on both sides is lost and the control circuit and brake circuit are grounded at (-) side through the diode; resistance causes revolution power and brake circuit to stop.

5-2 ADJUSTMENT AND REPAIR METHOD OF DIRECT DRIVE MOTOR

ADJUSTMENT OF TURNTABLE REVOLUTION (disconnect lead wire of brake relay.)

1. Adjustment revolution method with Special-type Strobo Scope

(each ±2%, ±4%, ±6% of 33-1/3, 45 r.p.m.)

(1) At 33-1/3 r.p.m. (In case of deviation at 33 r.p.m.)

Turn the 33-1/3 r.p.m. fine adjustment lever to F side, put a (-) screwdriver in the 33-1/3 r.p.m. adjustment hole at the bottom and adjust to +4% ~ +5% while observing the Strobo disc.

Next, turn the fine adjustment lever to S and confirm that it is adjusted to -4 ~ -5%, by observing Strobo disc. If (+)(-) revolution range is one-sided, repeat the above operation to adjust.

(2) At 45 r.p.m.

Turn the 45 r.p.m. fine adjustment lever from F to S side, put a (-) screwdriver in the 45 r.p.m. adjustment hole at the bottom and adjust in the same way as with 33-1/3 r.p.m. setting.

2. Method Using Frequency Record and Digital Frequency Counter

(1) At 33-1/3 r.p.m.

Turn the 33-1/3 r.p.m. fine adjustment lever while observing the Strobo window. When Strobo is stopped completely, play the Frequency Record, and record the sound slot regenerative frequency. (approx. 3000Hz). This frequency should be ±0% of 33-1/3 r.p.m.

Next, turn the 33-1/3 r.p.m. fine adjustment lever from F to S, read the same sound slot regenerative frequency, and change it to %, and put a (-) screwdriver in the 33-1/3 r.p.m. adjustment hole at the bottom, adjusting to +4 ~ +5, -4 ~ -5% so that (+)(-) revolution range is balanced.

(2) At 45 r.p.m.

Turn the 45 r.p.m. fine adjustment lever from F to S, and insert a (-) screwdriver in the 45 r.p.m. adjustment hole at the bottom, adjusting in the same way as with the 33-1/3 r.p.m. setting.

ADJUSTMENT FOR BRAKE CIRCUIT

After adjusting the revolution range of 33-1/3 and 45 r.p.m. by means of the turntable revolution adjustment, brake adjustment should be done. Then, reconnect the lead wire to the relay.

This brake is adjusted so that the relay is operated within a certain time to supply the motor with reverse revolution power, by employing emitter (TR605) voltage change when revolution is adjusted from 45 r.p.m. to 33-1/3 r.p.m.; it operates normally when revolution speed is 33-1/3 r.p.m.

1. Adjustment for Semi-Stationary VR605

TR-611 bias should be adjusted so that TR-610 is "OFF" at 45 r.p.m., "ON" at 33-1/3 r.p.m., and this semi-fixed variable resistor is setting bias for TR-611.

VR-605 should be adjusted so as to become 12V (TR610 collector voltage) when the turntable is stopped forcibly at -4% of 45 r.p.m. (S side).

(At this time, the normal voltage value of VR-605 on both sides is 6.8 ~ 7,5V)

As 12V position after forced stop has some width, it is necessary to be adjusted to lowest position.

N = NORMAL
F = FAST
S = SLOW

2. Parts Replacement Due to Resistance, Condenser Value Change

Although this brake is adjusted so that the relay is operated within a certain time, this time is determined by the discharge time of subsequent capacitor.

Until the relay is operated, the operation of each part is as follows:

(1) When revolution is changed from 45 r.p.m. to 33-1/3 r.p.m., TR-610 turns from OFF to ON.

(2) Electric charge charged at C608 10mfd is discharged and flows into R627,R631.(C608 discharge time = C609 C610 charge time)

(3) Reverse current flows into R631 to turn TR-612 OFF. (C608 discharge time = C609, C610 charge time)

(4) C609, C610 are charged. (C608 discharge time = C609, C610 charge time)

(5) When C608 is discharged from 12V to TR-610, with an emitter voltage of about 7.5V, TR-612 turns ON, and charge of C609, C610 is stopped. (C608 discharge time = C609, C610 charge time)

(6) At (3), as soon as TR-612 turns OFF, TR-613 turns ON and relay is operated. (C609, C610 discharge time.)

(7) When charge for C609 and C610 is stopped, C609, C610 discharge through R633 and TR-613 is ON. (C609, C610 discharge time.)

(8) When the electric charge of C609, C610 is discharged through R 633, TR-613 base-emitter, the relay operation is stopped. Because of the above operation, C609, C610 discharge time is changed and relay operation time is also changed according to the change of the value of resistance or condenser.

Therefore, the value of each resistance or condenser must be adjusted as part of brake-operation time adjustment.

However, as large change in resistance values causes the change of working point of the transistor, it is desirable to adjust condenser value.

SPEED ADJUSTMENT

Lamp Circuit Adjustment

Strobo Method for Turntable Adjustment

(1) Set VR802, 851, 852 in the medium position. (or Place VR802, 851, 852 in the medium position.)

(2) Turning revolution at 33-1/3 r.p.m., adjust VR802 so as to switch on the NORMAL lamp.

(3) Adjust the VR603 for revolution fine adjustment at 33-1/3 r.p.m. so that the frame of Strobo can be moved to the left side at the speed of 60 frames/minute (however in case of 60Hz, 72 frames/minute). AT this time, adjust VR851 so as to switch on F lamp.

(4) Adjust the VR603 for revolution fine adjustment at 33-1/3 r.p.m. so that the Strobo frame can be moved to right side at the speed of 60 frames/minute. (at 50Hz)

Then, adjust VR801 so as to switch on S lamp.

(5) Adjust the VR604 for revolution fine adjustment at 45 r.p.m. so that the Strobo frame can be moved to left side at the speed of 60 frames/minute.

Next, adjust VR852 so as to switch on F lamp. (however, in case of 60Hz, 72 frames/minute)

(6) S lamp is adjusted automatically at 45 r.p.m.

6. TROUBLESHOOTING HINTS

REPAIR PROCEDURES FOR THE TURNTABLE REVOLUTION SPEEDS CHANGE BRAKE			
Problem	**Cause**	**Locating Procedure**	**Counter-measure, Adjustment**
1. Brake not operating.	TR610, 611 defective VR695 defective	Inspect continuity with tester. At 45 r.p.m., VR both sides voltage = 6.8-7.5V is normal.	Replace Brake adjustment
2. Brake sometimes operated, causing revolution speed decrease. (except the changing revolution from 45 to 33 r.p.m.)	TR610, 611 defective VR605 aberration Turntable revolution deviated from normal operation.	Inspect continuity with tester. At 45 r.p.m. VR both sides voltage = 6.8-7.5V is normal. Turntable revolution, refer to P8(8).	Replace Brake adjustment Brake adjustment
3. Brake not released, low revolution speed.	D606 defective, short circuit. TR612 defective, OFF TR613 defective, short circuit.	Inspect continuity with tester. Inspect continuity with tester. Inspect continuity with tester.	Replace Replace Replace
4. Brake operation time is too short.	Value change in the subsequent resistances, condensers. R626 15K ohm R627 1.5K ohm R628 15K ohm R631 15K ohm R632 22K ohm R633 3.9K ohm C608 10mfd C609 33mfd C610 100mfd VR605 defective, aberration	Remove and measure with tester. At 45 r.p.m. VR both sides voltage = 6.8-7.5V is normal.	Replace Brake adjustment Brake adjustment

REPAIR METHOD FOR SPEED LAMP CIRCUIT

Problem	Cause	Locating Procedure	Counter-measure, Adjustment
1. S lamp does not light.	Lamp disconnection. TR853 (854) defective. D851, 852 defective.	Inspect the continuity of lamp. Insepct TR853 (854) continuity. Inspect continuity.	Replace Replace Replace
2. NORMAL lamp does not light.	D802 short TR805 defective. Lamp disconnection.	Inspect D802 continuity. Inspect TR805 continuity. Inspect N lamp.	Replace Replace Replace
3. F lamp does not light.	D801 short. TR803 defective. D.C. AMP. defective. D852, 851(853), TR853 (854) defective Lamp disconnection.	Inspect D801 continuity. Inspect TR803 continuity Inspect TR801, 802 continuity. Inspect TR853 (854) D852, 851 (853) continuity Inspect F lamp continuity.	Replace Replace Replace Replace Replace
4. Only S lamp is lighted.	Input is not added. D.C. AMP defective. D852, 851 (853) defective. TR853 (854) defective.	Inspect D801 continuity. Inspect TR801, 802 continuity. Inspect TR853 (854) continuity. Inspect D852, 851 (853) continuity.	Replace Replace Replace Replace
5. Only F lamp is lighted.	N lamp disconnection. D.C. AMP. defective. D852, 851 (853), TR853 (854) defective.	Inspect N lamp continuity. Inspect TR801, 802 continuity. Inspect D852, 851 (853), TR853 (854) continuity.	Replace Replace Replace
6. NORMAL, F lamps are lighted.	IC802 defective. TR804 defective.	When input 6-8V is added, IC802 ninth terminal voltage = 0-11V is normal. When F lamp is lighted, TR804 C-E voltage ≒ 0 is normal. Not normal in other cases.	Replace Replace
7. When Strobo indicates 0%, lamp indicates S or F.	Lamp circuit adjusting gap.		Replace, refer to lamp circuit adjustment.

REPAIR METHOD FOR REVOLUTION SPEED CHANGE SWITCH

Problem	Cause	Locating Procedure	Counter-measure, Adjustment
1. Turns at 33-1/3 r.p.m., but not at 45 r.p.m.	Leak caused by water drop attached to 33-1/3 r.p.m. Touch Button.	Remove the shield wire connected with 33-1/3 r.p.m. Touch Button and touch directly with finger.	Wipe the Touch Button with a dry cloth.
	Leak caused by water drop attached to Touch SW, PC plate input.	Touch the 45 r.p.m. Touch Button and see if 33-1/3 r.p.m. indicator lamp goes out.	Dry PC plate input.
	TR854 defective.	45 r.p.m. indicator lamp is lighted and turntable stops or turns at high speed.	Replace TR854
	TR852 defective.	45 r.p.m. indicator lamp is not lighted at all, or lamp does not go out even at 33-1/3 r.p.m.	Replace TR852
	TC-7400P defective.	In case above mentioned or other causes of failure, do not check out.	Replace TC-7400P
2. Turns at 45 r.p.m., but not at 33-1/3 r.p.m.	Leak caused by water drop attached to 45 r.p.m. Touch Button.	Remove the shield wire connected with 45 r.p.m. Touch Button and touch directly with finger.	Wipe the Touch Button with a dry cloth.
	Leak caused by water drop attached to Touch SW, PC plate input.	Touch the 33-1/3 r.p.m. Touch Button and see if 45 r.p.m. indicator lamp goes out.	Dry PC plate input.
	TR853 defective.	33-1/3 r.p.m. indicator lamp is lighted and turn-table stops or turns at high speed.	Replace TR853
	TR851 defective.	33-1/3 r.p.m. indicator lamp is not lighted at all or lamp does not go out even at 45 r.p.m.	Replace TR851
	TC-7400P defective.	In case above mentioned or other causes of failure, do not check out.	Replace TC-7400P
3. Turns at neither 33-1/3 nor 45 r.p.m.	Leak caused by a water drop attached to both 33-1/3 and 45 r.p.m. Touch Buttons. Leak caused by water drop attached to SW, PC plate input.	Remove the shield wire connected with Touch Button and touch directly with finger. Both 33-1/3 and 45 r.p.m. touch indicator lamps are not lighted.	Wipe the Touch Button with a dry cloth. Dry PC plate input.
4. Revolution indicator lamp is not lighted.	Lamp defective.	Both 33-1/3 and 45 r.p.m. are normal.	Replace lamp.
5. When source SW is ON, turn-table turns at 45 r.p.m.	D854 or D855 defective.	Both 33-1/3 and 45 r.p.m. are normal after start.	Replace D854, D855

REPAIR METHOD FOR TURNTABLE REVOLUTION, ETC.

Problem	Cause	Locating Procedure	Counter-measure, Adjustment
1. Loss of Power.	Fuse blown.	Inspect continuity by eye or with tester.	Replace with rating 1.5A.
	Power switch defective.	Insepct continuity with tester.	Replace
2. Fuse blown.	Power transformer short-circuited.	Secondary side red — core short, remove lead wire to inspect the continuity of red-panelboard.	Replace
	Motor's stater coil short-circuited.	Stater coil — core, short, remove lead wires of stater coil to inspect continuity of red, white, black — panelboard.	Replace
3. Strobo Neon lamp is not lighted.	Fuse blown.	Refer to Problem 1.	
	Power switch defective.	Refer to Problem 2.	
	Resistance R901, R902, 22k ohm disconnected or solder detached.	Measure resistance value with tester.	Replace or resolder.
4. No revolution.	9 pin socket contact defective.	Inspect extent of socket contact position.	Shorten contact position.
	Lamp (for revolution control) disconnected, resistance disconnected.	Inspect lamp contact position.	Replace lamp, resistance.
	D.C. source lost, 0V.	Shift the lampholder at the back side of panel-board and inspect the light.	Refer to Problem 4-1.
	Disconnection of TR609 2SC-789, TR001	Measure the voltage between 12V pin and panelboard with tester.	Replace or resolder.
4-1. D.C. source 12V is not supplied, 0V.	Disconnection of 2SD-235	Inspect continuity by eye or with tester.	Replace or resolder.
	C001 16V100 mfd short-circuited.	Inspect continuity with tester.	Replace
5. Large deviations in revolution speed.	Rotor and stater touching.	Remove slitcover and insert the rotor only to turn and inspect it.	Tighten the stater fitting screw.
	Rotor and cover touching.	Inspect proximity of rotor axis through cover.	Shift rotor axis with a 2m/m hex wrench.
	Slit and stater coil touching.	Remove cover and turn rotor to inspect.	
	Slit to slit (small) touching.	Remove cover and turn rotor to inspect.	
	Extreme wearing of slit.	Remove cover and turn rotor to inspect.	

Problem	Cause	Locating Procedure	Counter-measure, Adjustment
6. Turns at high speed.	TR609 2SC-789 short-circuited. TR603, TR604 2SC-733 defective. Disconnection of resistance R636 27 ohm.	Remove lead wires to inspect continuity. TR603 or TR604 collector voltage wave is not pulse-shaped. (revolution period) Inspect continuity with tester.	Replace Replace Replace
7. Turns at low speed.	9 pin socket contact defective. Disconnection, Lead wire from VR603 to TR854, Lead wire from VR604 to TR853. Water drop attached to both speed change buttons. Brake not released. (D606, TR613, TR612 defective)	Inspect extent of socket contact position, and VR603, VR604 pin contact position. Visually inspect, VR603, VR604 and lead wire of PC board of lamp position. Visually inspect the panel-board, upper side and around button at the back. Remove the turntable and inspect continuity with tester.	Shorten the contact position. Solder Wipe off moisture. Replace or refer to brake adjustment method.
8. Revolution is slightly irregular at 33-1/3, 45 r.p.m. Adjustment cannot be effected with a speed adjustment knob. Revolution change is one-sided.	Movement of VR601, 602. The value change in below-mentioned resistances, condensers. C606 0.047mfd C607 4.7mfd R612 120K ohm R614 5.6K ohm R615 560 ohm R617 470 ohm R618 820 ohm R619 470 ohm R621 470 ohm R620 560 ohm	Remove the turntable and measure the voltage with tester.	Refer to adjusting method. Replace

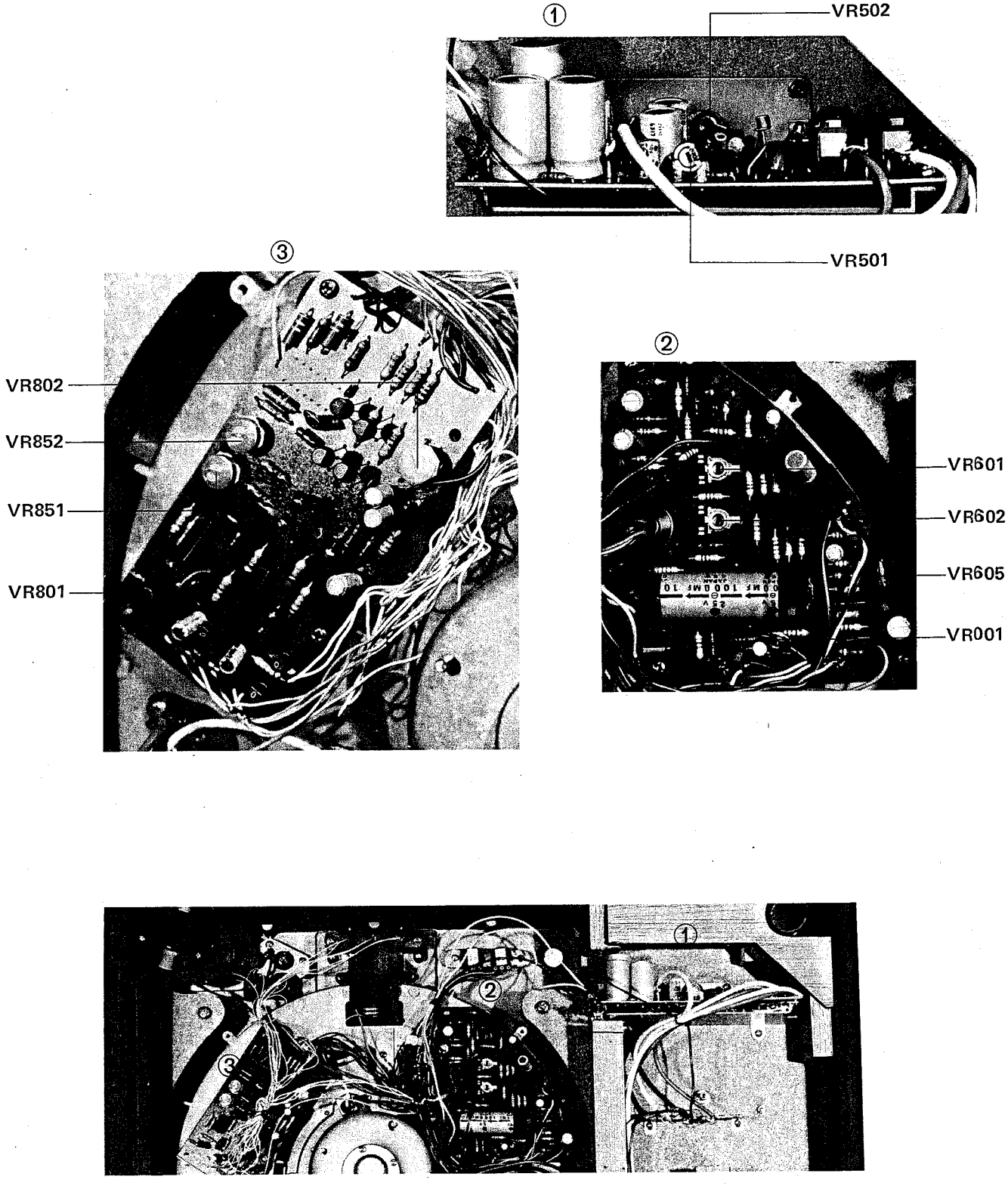
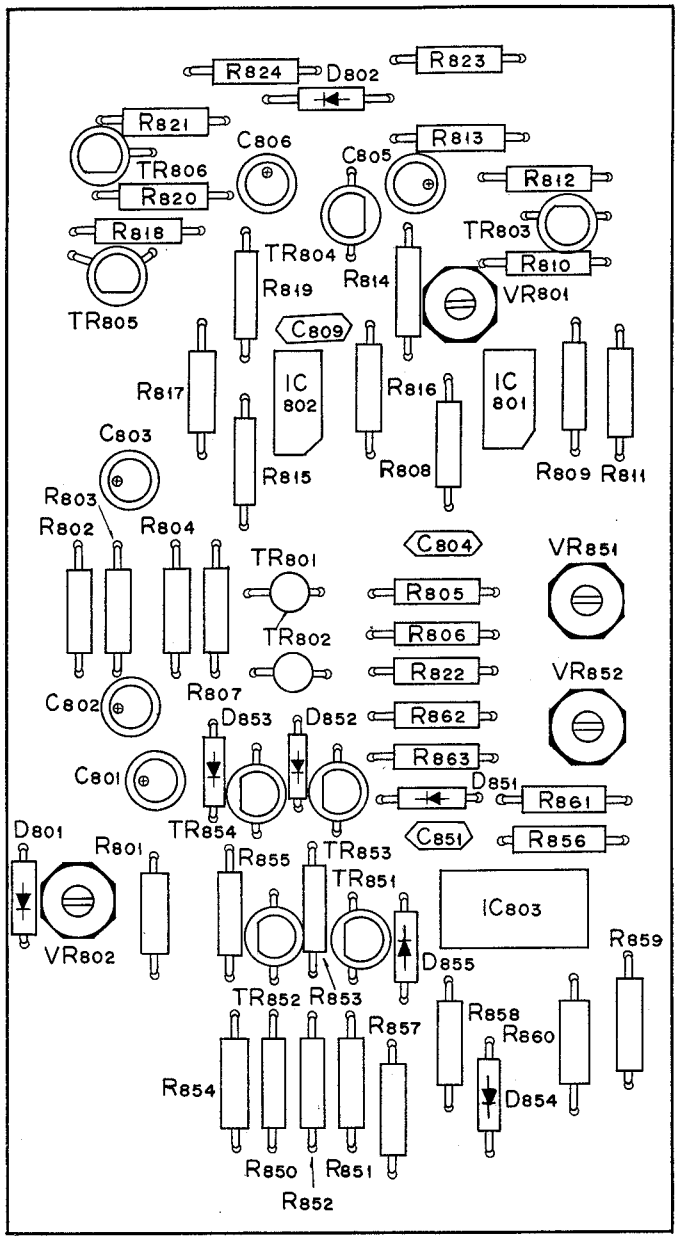

①
VR502
VR501
③
VR802
VR852
VR851
VR801
②
VR601
VR602
VR605
VR001
①
②
③

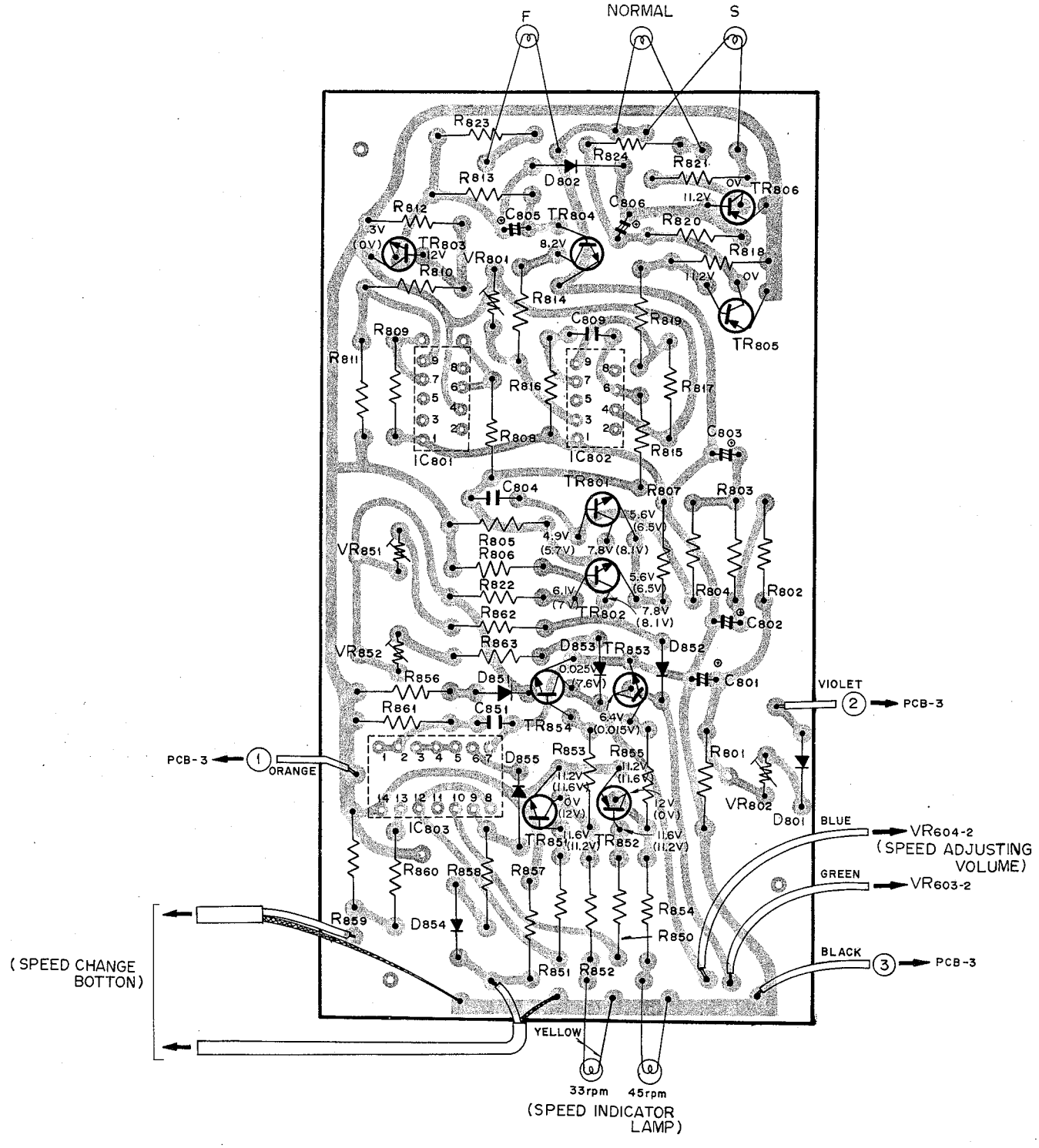
Figure 24

8. PRINTED CIRCUIT BOARD DIAGRAMS

8-1 LAMP CIRCUIT BOARD (PCB-1)

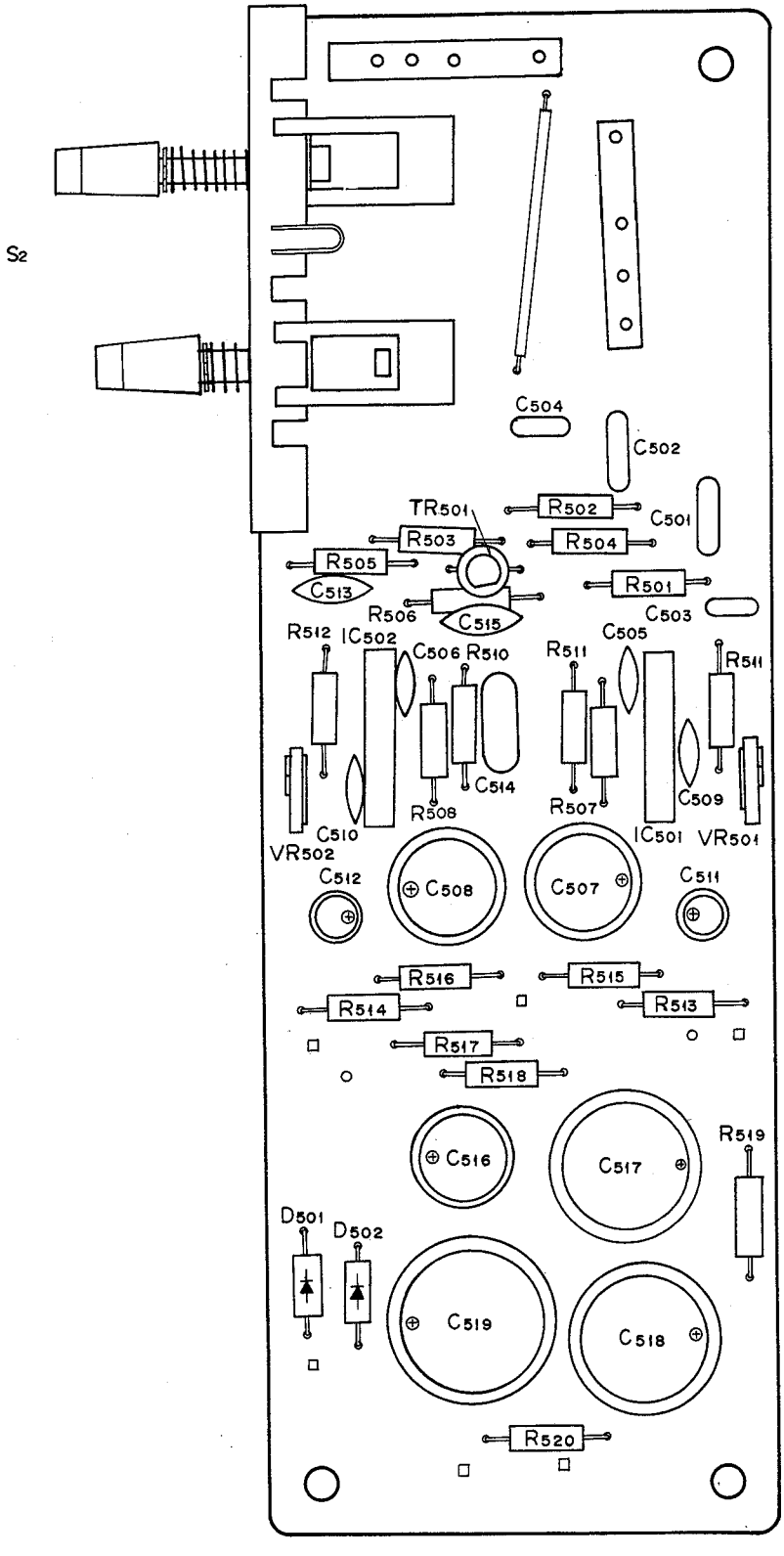


TOP VIEW

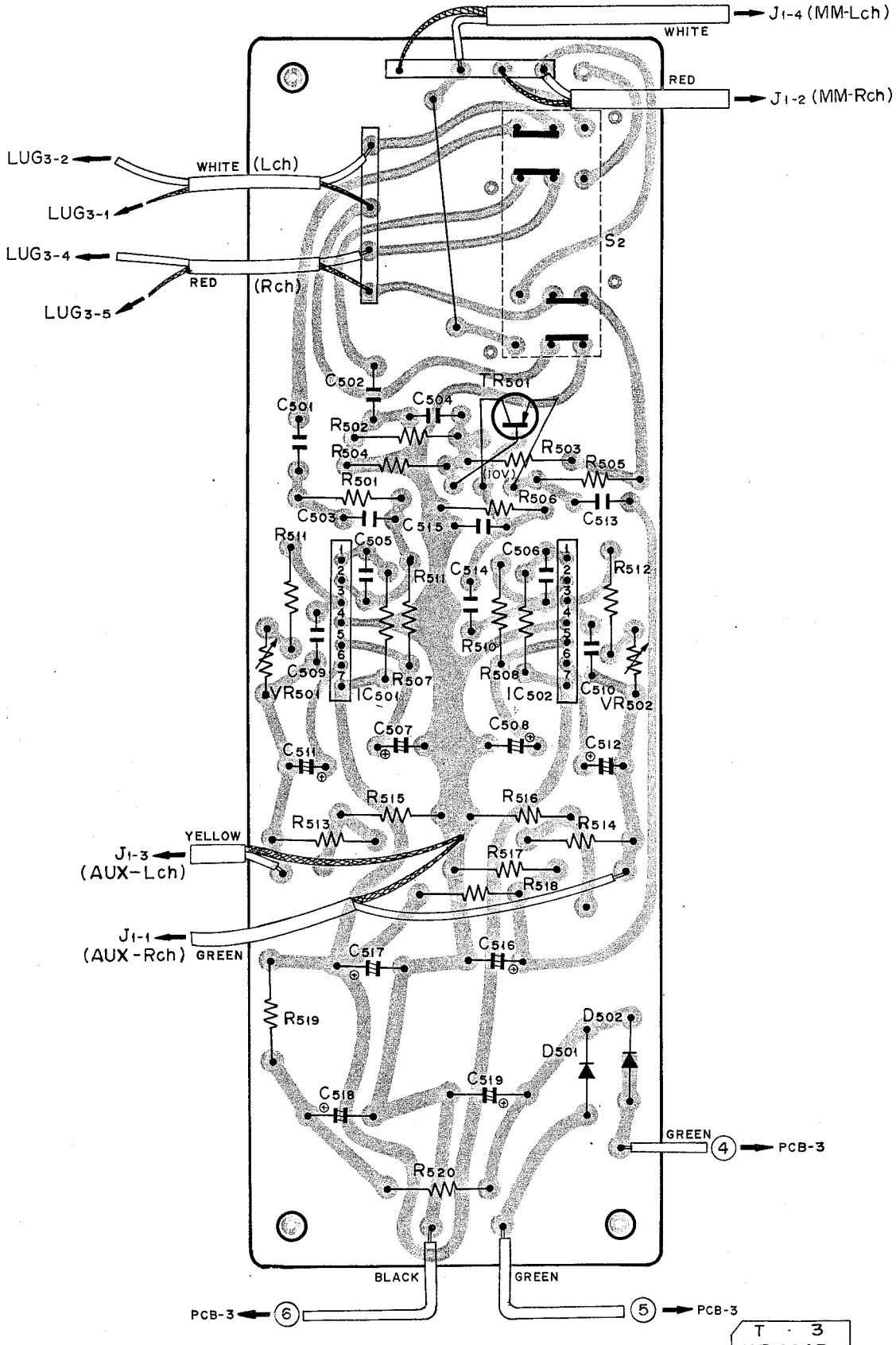

F
NORMAL
S
R823
R824
R821
R813
D802
TR806
R812
C805
TR804
C806
R820
TR803
VR801
R818
R810
R814
C809
R819
TR805
R811
R809
R816
R817
IC801
IC802
R808
R815
C803
C804
TR801
R807
R803
R805
R806
VR851
R822
R804
R802
TR802
C802
R862
VR852
R863
D853
TR853
D852
R856
D851
C801
VIOLET
PCB-3
R861
C851
TR854
PCB-3
ORANGE
D855
R853
R855
R801
VR802
D801
IC803
BLUE
VR604-2
(SPEED ADJUSTING VOLUME)
GREEN
VR603-2
R860
R858
R857
TR851
TR852
R859
D854
R854
R850
BLACK
PCB-3
(SPEED CHANGE BOTTON)
R851
R852
YELLOW
33rpm
45rpm
(SPEED INDICATOR LAMP)

BOTTOM VIEW

8-2 PRE-AMP. CIRCUIT BOARD (PCB-2)

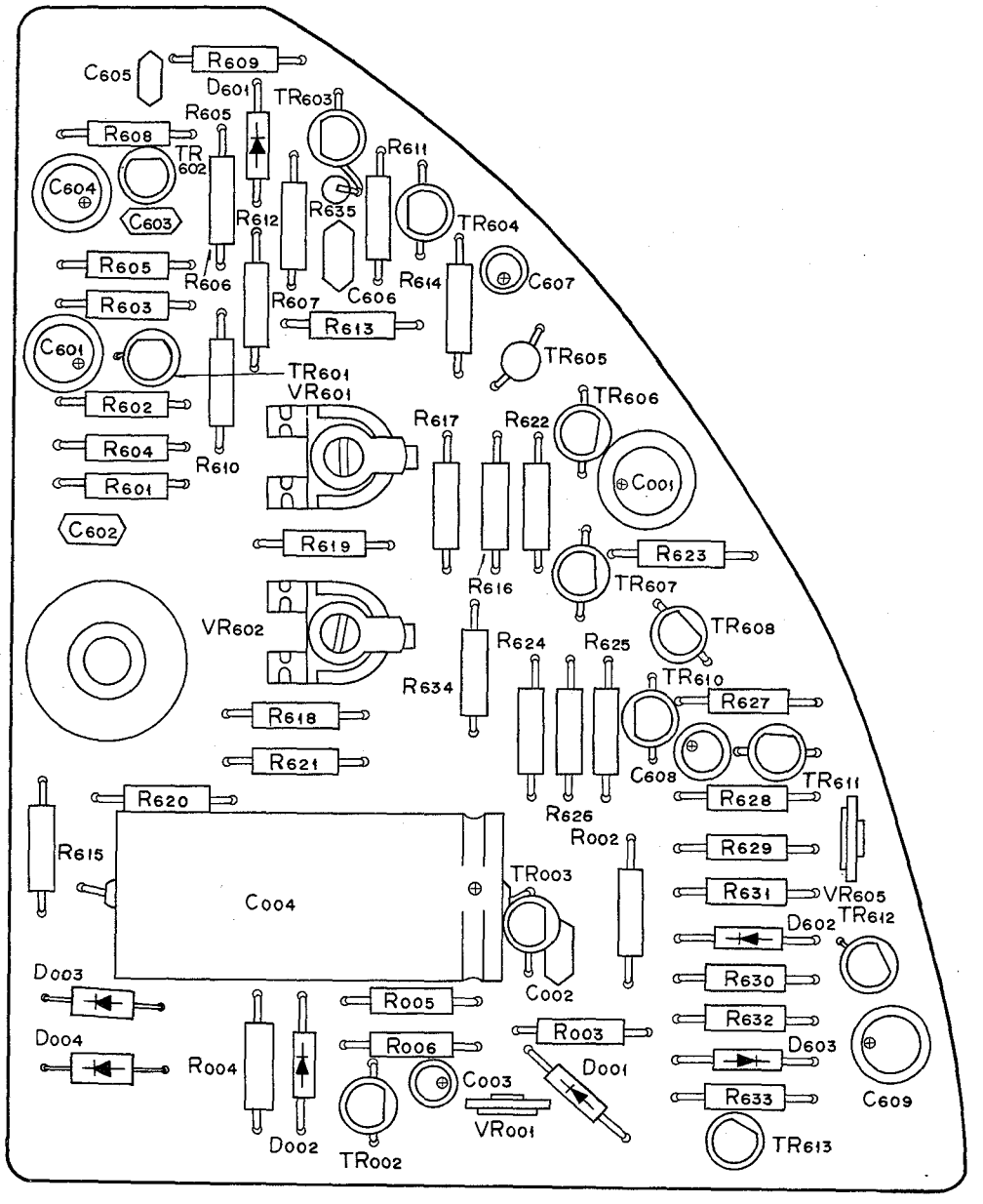


TOP VIEW

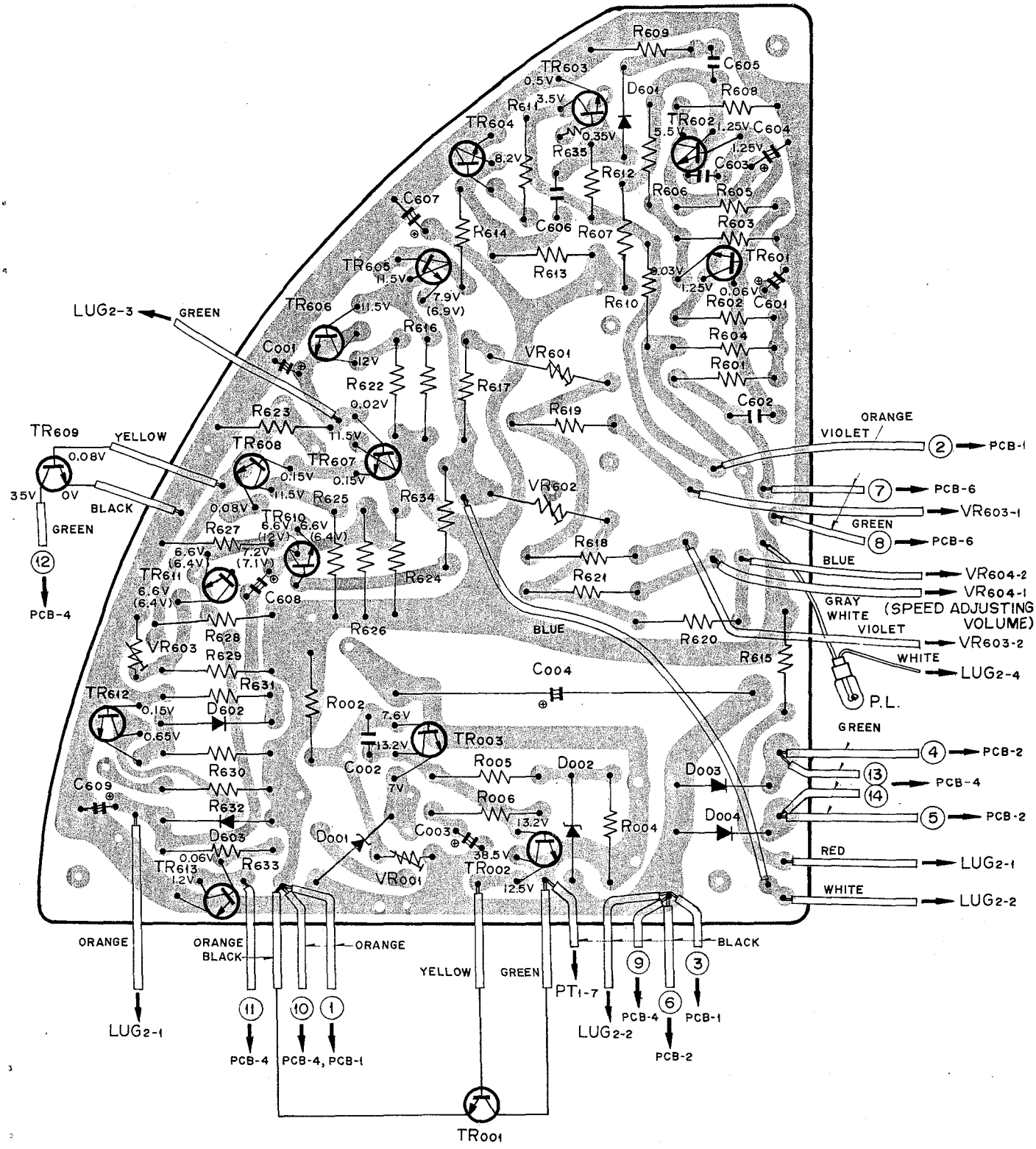

J1-4 (MM-Lch)
WHITE
RED
J1-2 (MM-Rch)
LUG3-2
WHITE (Lch)
LUG3-1
LUG3-4
RED (Rch)
LUG3-5
S2
C502
C504
C501
TR501
R502
R504
R503
R505
R501
(low)
R506
C503
C515
C513
R511
C505
C506
R512
C514
R510
R508
C509
R507
IC501
IC502
C510
VR501
VR502
C507
C508
C511
C512
R515
R516
R513
R514
YELLOW
J1-3
(AUX-Lch)
R517
R518
J1-1
(AUX-Rch)
GREEN
C517
C516
R519
D502
D501
C519
C518
GREEN
4
PCB-3
R520
BLACK
GREEN
PCB-3
6
5
PCB-3
T · 3
TA7122AP
1 2 3 4 5 6 7

BOTTOM VIEW

8-3 SPEED CONTROL CIRCUIT BOARD (PCB-3)

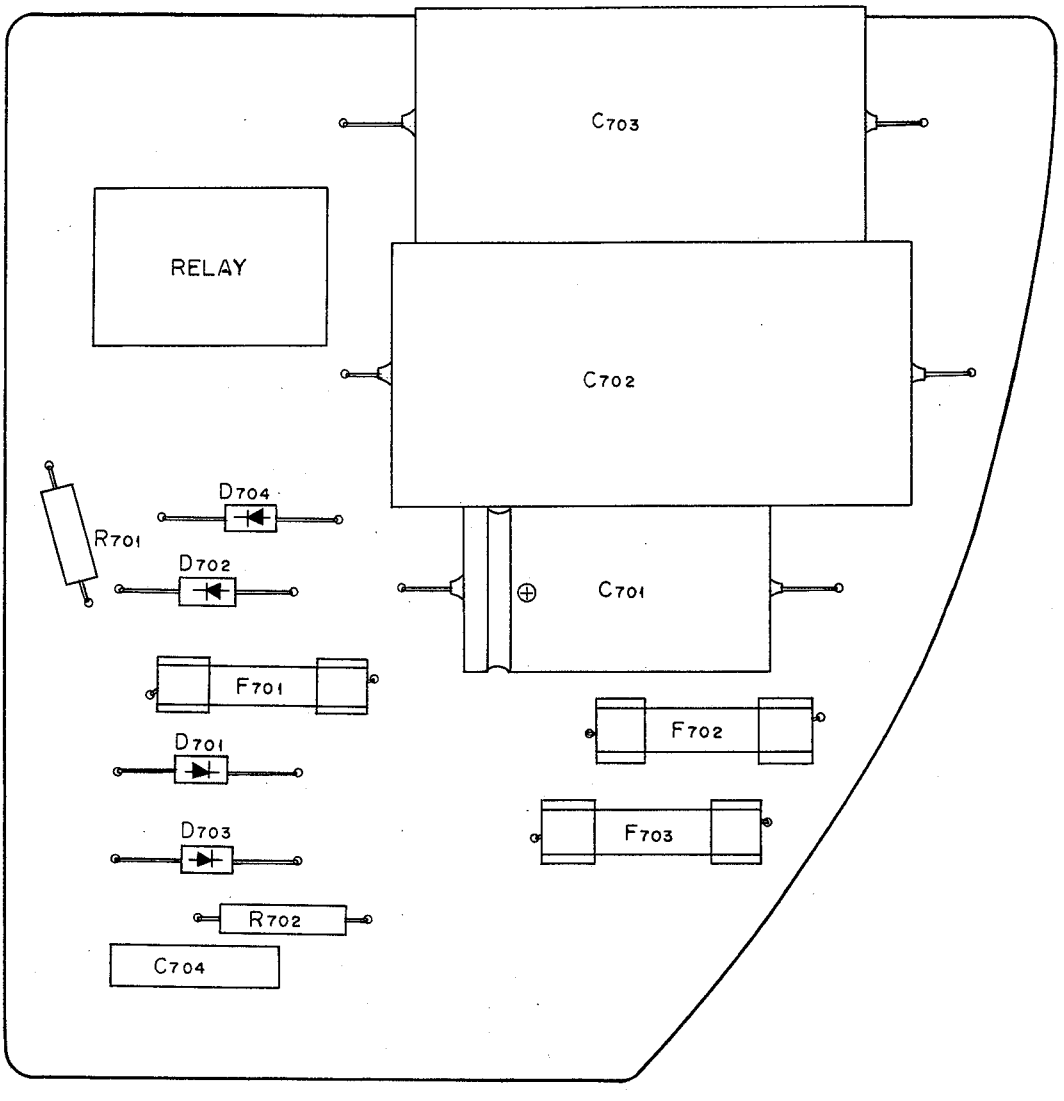


TOP VIEW

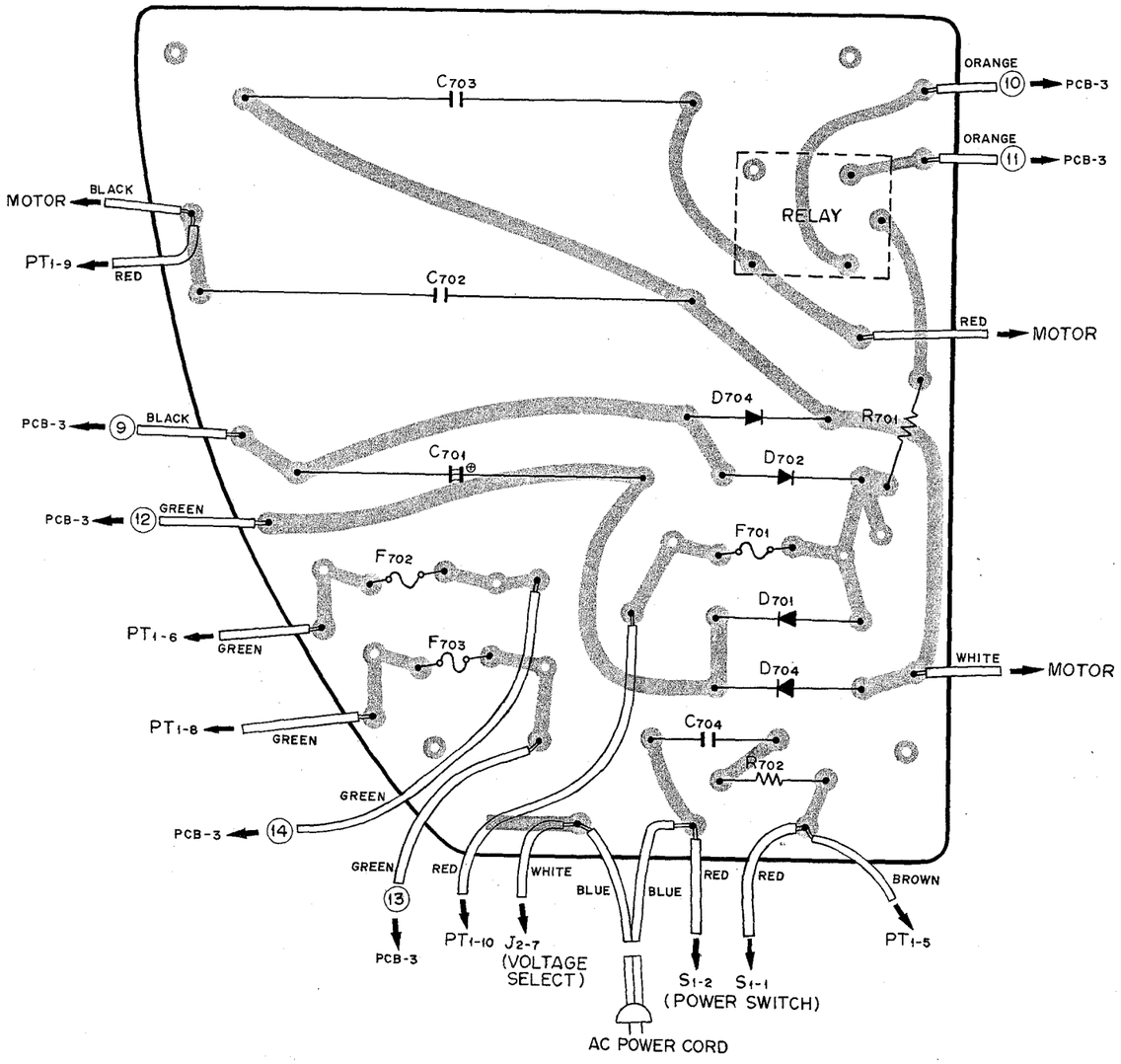

R609
C605
TR603
0.5V
D601
R608
R611
3.5V
TR604
TR602
5.5V
1.25V
C604
0.35V
8.2V
R635
1.25V
C603
R612
R606
R605
C607
R614
C606
R607
R603
TR605
11.5V
7.9V
(6.9V)
R613
TR601
9.03V
1.25V
0.06V
C601
TR606
11.5V
R610
R602
LUG2-3
GREEN
R616
C001
12V
R604
VR601
R622
0.02V
R617
R601
R623
R619
C602
ORANGE
VIOLET
TR609
YELLOW
0.08V
TR608
TR607
0.15V
0.15V
11.5V
11.5V
R625
R634
VR602
35V
0V
BLACK
0.08V
TR610
6.6V
(12V)
6.6V
(6.4V)
R627
R618
GREEN
BLUE
6.6V
(6.4V)
7.2V
(7.1V)
TR611
R624
R621
6.6V
(6.4V)
C608
GRAY
WHITE
VIOLET
WHITE
R626
BLUE
R620
R615
VR603
R628
R629
R631
C004
TR612
0.15V
D602
R002
7.6V
0.65V
TR003
13.2V
C002
R005
D002
D003
R630
7V
C609
R632
R006
13.2V
D004
R004
D001
C003
38.5V
TR002
TR613
0.06V
1.2V
R633
VR001
12.5V
ORANGE
ORANGE
BLACK
ORANGE
YELLOW
GREEN
BLACK
PT1-7
LUG2-1
LUG2-2
PCB-4
PCB-1
PCB-2
PCB-4
PCB-4, PCB-1
TR001
P.L.
(SPEED ADJUSTING VOLUME)
VR604-2
VR604-1
VR603-1
VR603-2
LUG2-4
LUG2-1
LUG2-2
PCB-1
PCB-6
PCB-6
PCB-2
PCB-4
PCB-2
PCB-4
PCB-1
PCB-2

BOTTOM VIEW

8-4 POWER SUPPLY CIRCUIT BOARD (PCB-4)

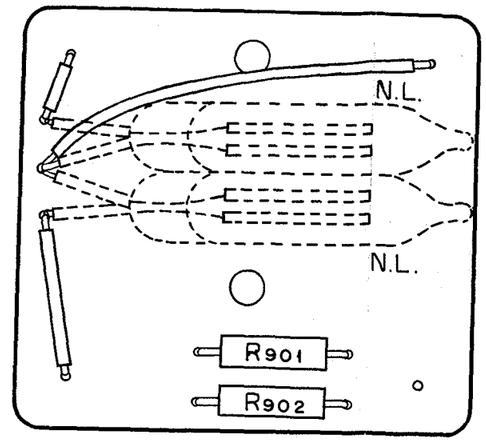


TOP VIEW

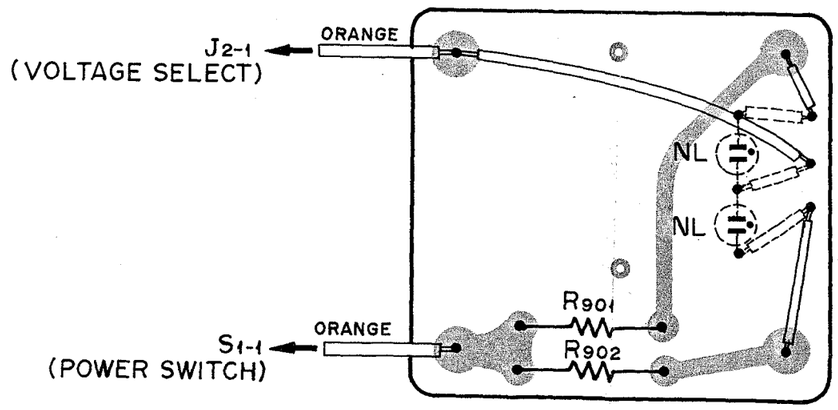


BOTTOM VIEW

8-5 NEON LAMP CIRCUIT BOARD (PCB-5)

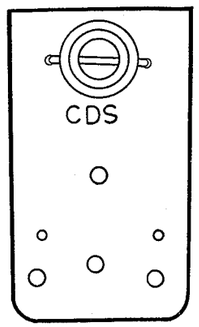


TOP VIEW

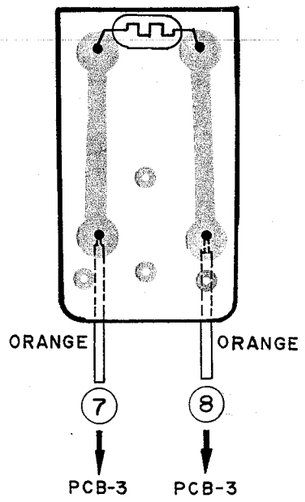


BOTTOM VIEW

8-6 CdS CIRCUIT BOARD (PCB-6)



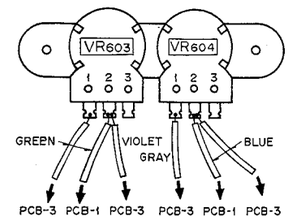
TOP VIEW



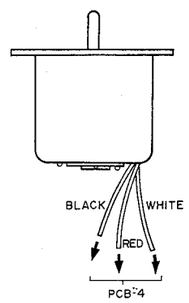
BOTTOM VIEW

9. SEVERAL PARTS CONNECTIONS

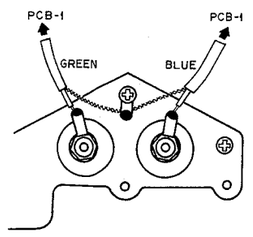
VR603, VR604 SPEED INDICATOR VOLUME



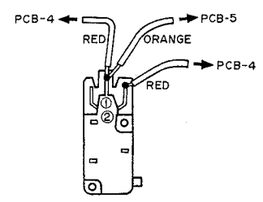
MOTOR



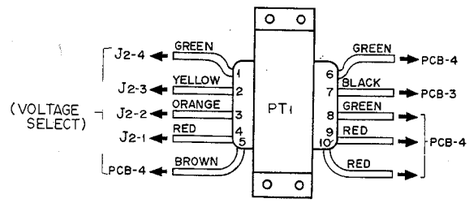
SPEED CHANGE BUTTON



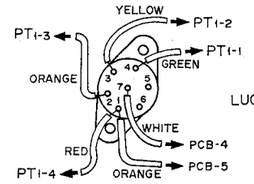
S1 POWER SWITCH(START/STOP)



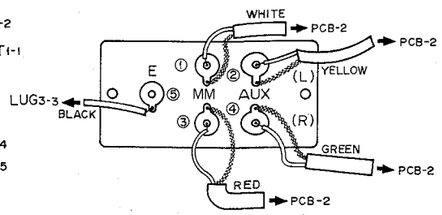
PT1 POWER TRANS



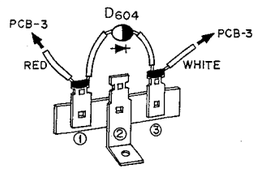
J2 VOLTAGE SELECT



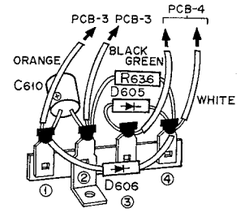
J1 AUX/MM TERMINAL JACK



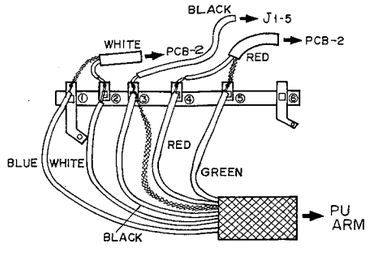
LUG 1



LUG 2



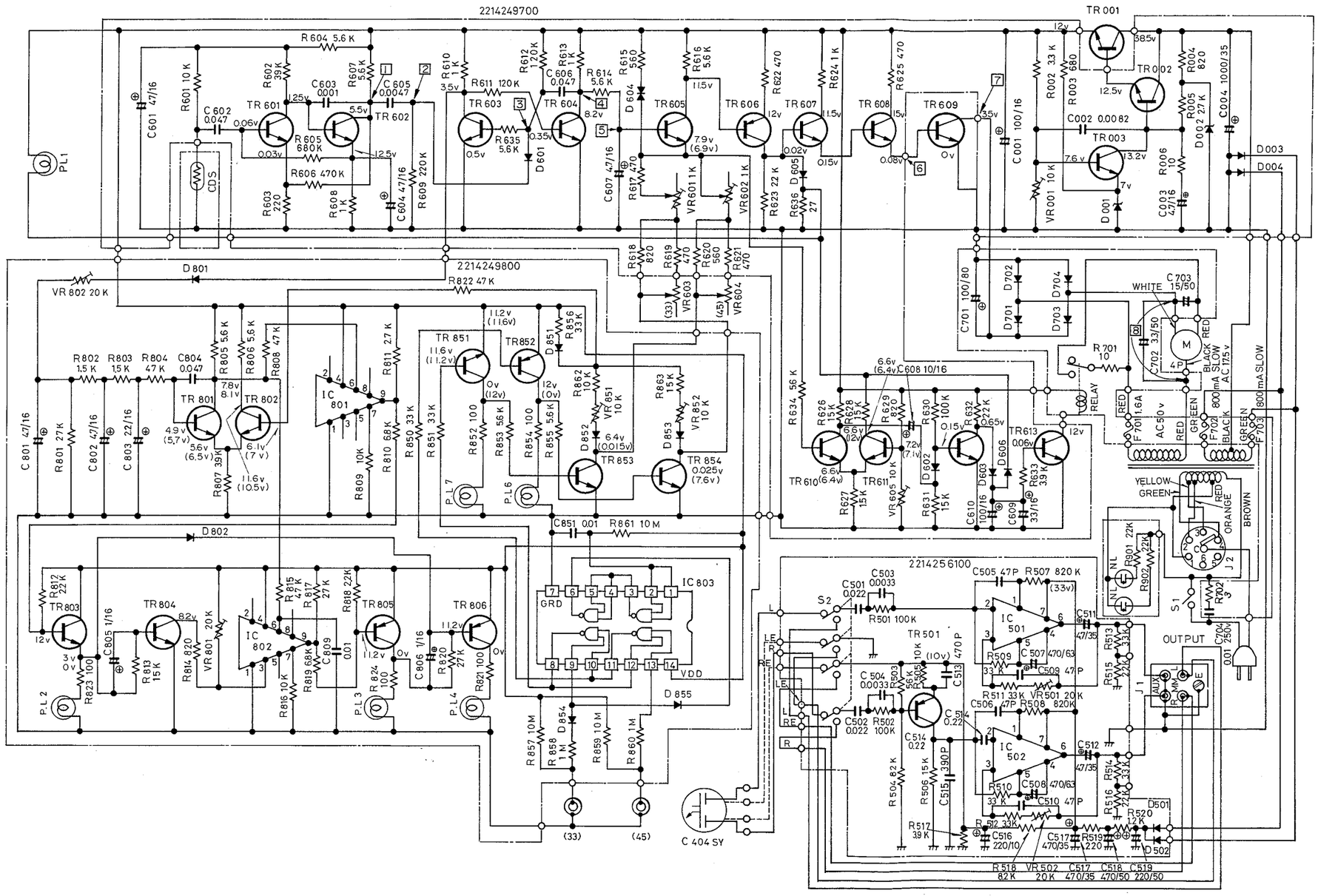
LUG 3



The righthand waveforms are standard at the point shown in the schematic diagram.

1. All waveforms are taken with wide-band oscilloscope and low capacity grobe.
2. All waveforms are taken from revolution of turntable at 33 1/3 r.p.m.
3. Power voltage is the rated voltage (110V, 120V, 220V, 240V) 50Hz.

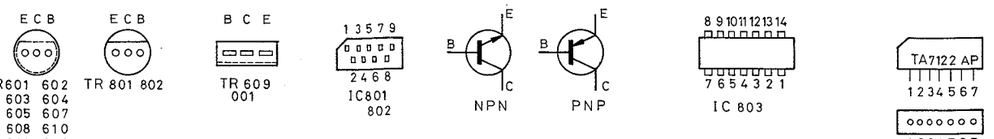
1 11.7vp-p 82.79Hz
2 17vp-p 82.79Hz
3 20vp-p 82.79Hz
4 11.5vp-p 82.79Hz
5 0.9vp-p 82.79Hz
6 0.57vp-p 82.79Hz
7 40vp-p 82.79Hz
8 0.3vp-p 82.79Hz



1) ALL RESISTANCE VALUES ARE IN OHMS.
ALL CAPACITANCE VALUES ARE IN MICROFARADS.

K=1000 M=1000000 $P=\frac{1}{1000000}$

2) PARENTHESES VOLTAGES REFER TO 45rpm PLAY.
3) COMPONENTS AND VALUES ARE SUBJECT TO CHANGE WITHOUT NOTICE FOR IMPROVEMENT.

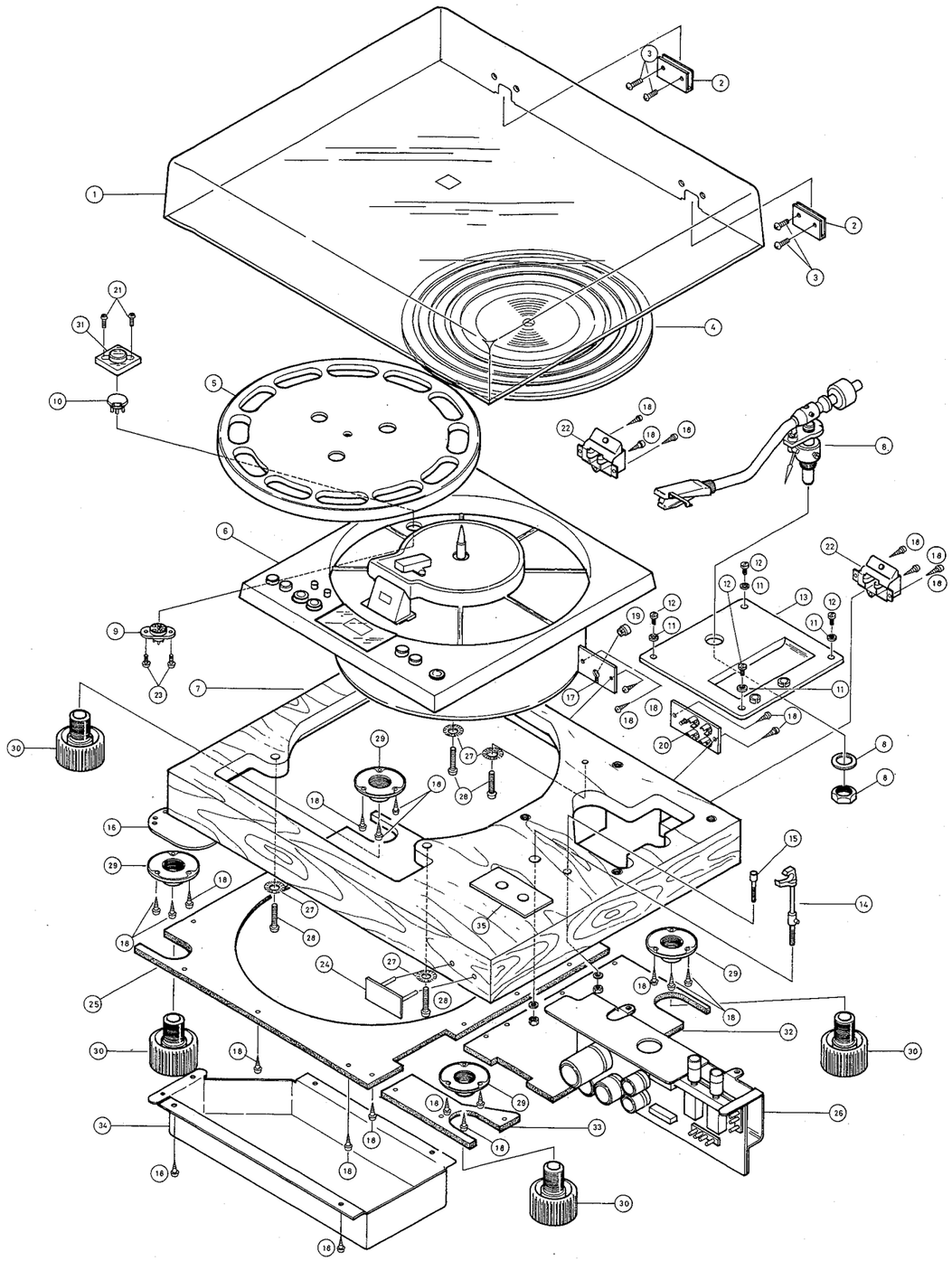


10. SCHEMATIC DIAGRAM

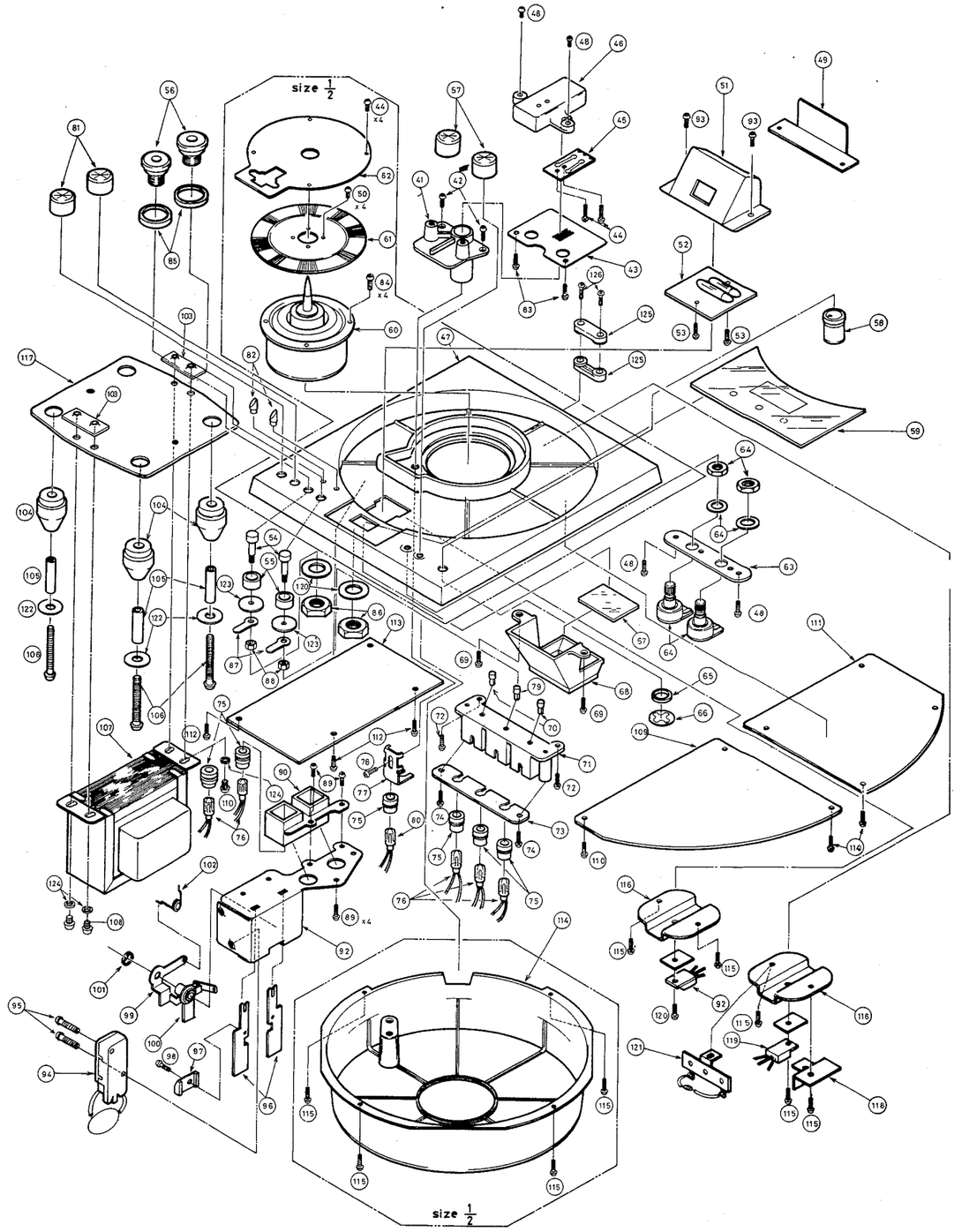
TR601	2SC732	SPEED CONTROL
TR602	2SC732	〃
TR603	2SC733	〃
TR604	2SC733	〃
TR605	2SC536	〃
TR606	2SA562	〃
TR607	2SC733	〃
TR608	2SC733	〃
TR609	2SC789	〃
TR610	2SC733	SPEED CHANGE BRAKE
TR611	2SC733	〃
TR612	2SC733	〃
TR613	2SC733	〃
TR801	2SC536	SPEED LAMP
TR802	2SC536	〃
TR803	2SA562	〃
TR804	2SC372	〃
TR805	2SA562	〃
TR806	2SA562	〃
TR851	2SA562	SPEED CHANGE
TR852	2SA562	〃
TR853	2SC735	〃
TR854	2SC735	〃
IC801	LD3200	SPEED LAMP
IC802	LD3200	〃
IC803	TC7400P	SPEED CHANGE
TR001	2SD235	POWER SUPPLY
TR002	2SC733	〃
TR003	2SC733	〃
D 601	1S1555	SPEED CONTROL
D 602	1S1555	SPEED CHANGE BRAKE
D 603	1S1555	〃
D 604	MV 11	SPEED CONTROL
D 605	1S1555	〃
D 606	IN60	SPEED CHANGE BRAKE
D 001	WZ 071	POWER SUPPLY
D 002	WZ 150	〃
D 003	1S1885	RECTIFIER
D 004	1S1885	〃
D 701	1S1885	SPEED CONTROL
D 702	1S1885	〃
D 703	1S1885	〃
D 704	1S1885	〃
D 801	1S1555	SPEED LAMP
D 802	IN60	〃
D 851	IN60	SPEED CHANGE
D 852	1S1555	〃
D 853	1S1555	〃
D 854	1S1555	〃
D 855	1S1555	〃
TR501	2SA493Y	PHASE SHIFT
IC501	TA7122AP	AMPLIFIER
IC502	TA7122AP	〃
D 501	1S1885	RECTIFIER
D 502	1S1885	RECTIFIER

11. EXPLODED VIEW

(PLAYER I)



(PLAYER II)



12. EXPLODED VIEW PARTS LIST

Key No.	Part No.	Description
		PLAYER-I
1.	20847698	Dust Cover
2.	20753788	Hinge-B
3.		TRS40 x 10MSCR2
4.	20723030	Table Sheet
5.	20723673	Turntable
6.		Phono Motor Assembly
7.	22847688	Cabinet
8.	20731710	Pickup Arm Assembly
9.	22167211	Voltage Selecting Socket
10.	22164257	Voltage Selecting Plug
11.	20791859	Washer, Arm Base
12.	22701537	Special Screw, Arm Base
13.	20743809	Arm Base
14.	20738678	Pickup Arm Rest
15.	20862697	Center Adapter Holder
16.	22748587	Barrier, Power Switch
17.	20746790	Support, Power Cord
18.		W-PAN31 x 12MSBLK
19.	20881676	Stopper, Power Cord
20.	22162056	Output Terminal
21.		T-PAN30 x 8MSZM1
22.	20861686	Hinge-B
23.		T-PAN30 x 6MSZM1
24.	22861516	Mark
25.	22852563	Button Board
26.		Equalizer Amp.
27.		L-WAS60 x MS-B
28.		PAN60 x 30MSZM1
29.	22752767	Foot Stand
30.	22754702	Foot Holder
31.	20749672	Voltage Selector Cover
32.	22852564	Button Board
33.	22842568	Button Board
34.	22842501	Cover AMP
35.	20836074	Nameplate, Cartridge Select

Key No.	Part No.	Description
		PLAYER-II
41.	22754709	Lamp Case
42.		T-PAN30 x 8MSZM1
43.	22740503	Plate, Slit
44.		T-PAN26 x 6MSZM1
45.	22142496	PC Board, CdS
46.	22754697	CdS Case
47.	20713769	Panel
48.		T-PAN30 x 6MSZM1
49.	22748592	Barrier, Neon Lamp
50.		PAN26 x 6MSZM1
51.	22754763	Neon Lamp Case
52.	22130261	Neon PC Board Assembly
53.		T-PAN26 x 6MSZM1
54.	22845609	Touch Button
55.	22752782	Stud
56.	22845610	Touch Button
57.	22824551	Knob Assembly, Volume
58.	22843890	Level
59.	22865239	Nameplate, Speed Indicator
60.	22125428	Motor Assembly
61.	22740502	Plate, Slit
62.	22754701	Slit Case
63.	22754690	Bracket, Volume
64.	22622200	Volume, Speed Adjusting
65.	22752794	Washer, Level
66.		Ring, CS160
67.	22833686	Mirror
68.	22754698	Mirror Case
69.		T-PAN30 x 6MSZM1
70.	22822645	Lens (Red)
71.	22754700	Lamp Holder
72.		T-PAN30 x 6MSZM1
73.	22754691	Lamp Bracket
74.		T-PAN30 x 6MSZM1
75.	20881669	Rubber Bushing
76.	22113246	Pilot Lamp
77.	22754708	Lamp Holder
78.		PAN26 x 6MSZM1
79.	25822644	Lens (Green)
80.	22113288	Pilot Lamp

Key No.	Part No.	Description
81.	22824541	Push Button
82.	22833703	Lens (Orange)
83.		PAN26 x 6MSZM1
84.		T-PAN40 x 8MSZM1
85.	22752783	Spacer
86.	22702507	Nut, 10ϕ
87.	22161066	Lug, 3ϕ
88.		Nut 30BSN1
89.		T-PAN30 x 6MSZM1
90.	22754729	Lamp Holder
91.	36823540	Transistor, 2SD235
92.	22754695	Switch Bracket
93.		T-PAN30 x 6MSZM1
94.	22146335	Micro Switch, Power
95.		PAN30 x 15MSZM1
96.	20753792	Lever, Seesaw
97.	22742543	Cam, Switch
98.		T-PAN26 x 6MSZM1
99.	22746519	Lever
100.	22754692	Plate, Seesaw
101.		E-Ring, 30
102.	22771648	Torsion Spring
103.	20702510	Special Nut
104.	20881753	Rubber Cushion
105.	20773671	Spacer
106.		T-PAN40 x 32MSZM1
107.	22213652	Power Transformer
108.		PAN40 x 6MSZM1
109.	22130260	Speed Indicator PC Board Assembly
110.		T-PAN30 x 6MSZM1
111.	22138207	Power Supply PC Board Assembly
112.		T-PAN30 x 15MSZM1
113.	22130259	Control PC Board Assembly
114.	20846608	Bottom Cover
115.		T-PAN30 x 8MSZM1
116.	22748556	Radiator
117.	22754693	Trans. Support
118.	22754748	Holder, Varistor
119.	36738440	Transistor, 2SC789
120.	20791632	Special Washer

Key No.	Part No.	Description
121.	22161259	Lug Terminal
122.	20791656	Washer
123.	20791632	Insulating Washer
124.		S, WAS40MS
125.	22184130	Cord Stopper
126.		T-PAN30 x 15MSZM1

13. PARTS LIST

Key No.	Part No.	Description
		SPEED CONTROL UNIT
	22130259	Control P.C. Board Assembly
		SEMICONDUCTORS
TR001		Transistor, 2SD235-O
TR002		Transistor, 2SC733-GR
TR003		Transistor, 2SC733-GR
TR601		Transistor, 2SC732-BL
TR602		Transistor, 2SC732-BL
TR603		Transistor, 2SC733-GR
TR604		Transistor, 2SC733-GR
TR605	22114300	Transistor, 2SC536-D
	(22114247)	Transistor, (2SC536-E)
TR606		Transistor, 2SA562-Y
TR607		Transistor, 2SC733-GR
TR608		Transistor, 2SC733-GR
TR609	36738440	Transistor, 2SC789-O
TR610		Transistor, 2SC733-GR
TR611		Transistor, 2SC733-GR
TR612		Transistor, 2SC733-GR
TR613		Transistor, 2SC733-GR
D001	22115225	Diode, WZ071
D002	22115220	Diode, WZ150
D003		Diode, 1S1885
D004		Diode, 1S1885
D601		Diode, 1S1555
D602		Diode, 1S1555
D603		Diode, 1S1555
D604	22692015	Varistor, MV11
D605		Diode, 1S1555
D606		Diode, 1N60
		RESISTORS *
VR001	22658194	Semi-Fixed Resistor, 10K ohm (Voltage Adjusting)
VR601	22658258	Semi-Fixed Resistor, 1K ohm (Speed Adjusting)
VR602	22658258	Semi-Fixed Resistor, 1K ohm (Speed Adjusting)
VR603	22622200	Variable Resistor, 1K ohm (Speed Adjusting)
VR604	22622200	Variable Resistor, 1K ohm (Speed Adjusting)
VR605	22658194	Semi-Fixed Resistor, 10K ohm (Brake Adjusting)
VR606	22658194	Semi-Fixed Resistor, 10K ohm (Brake Adjusting)
R002	22546332	3.3K ohm
R003	22546681	680 ohm
R004	22545821	820 ohm, ±5%
R005	22546272	2.7K ohm
R006	22546100	10 ohm
R601	22546103	10K ohm

Key No.	Part No.	Description
R602	22546393	39K ohm
R603	22546221	220 ohm
R604	22545562	5.6K ohm, ±5%
R605	22546684	680K ohm
R606	22546474	470K ohm
R607	22545562	5.6K ohm, ±5%
R608	22545102	1K ohm, ±5%
R609	22546224	220K ohm
R610	22545102	1K ohm, ±5%
R611	22545124	120K ohm, ±5%
R612	22545124	120K ohm, ±5%
R613	22545102	1K ohm, ±5%
R614	22545562	5.6K ohm, ±5%
R615	22545561	560 ohm, ±5%
R616	22545562	5.6K ohm, ±5%
R617	22545471	470 ohm, ±5%
R618	22545821	820 ohm, ±5%
R619	22545471	470 ohm, ±5%
R620	22545561	560 ohm, ±5%
R621	22545471	470 ohm, ±5%
R622	22545471	470 ohm, ±5%
R623	22546222	2.2K ohm
R624	22545102	1K ohm, ±5%
R625	22545471	470 ohm, ±5%
R626	22545153	15K ohm, ±5%
R627	22545152	1.5K ohm, ±5%
R628	22545153	15K ohm, ±5%
R629	22545821	820 ohm, ±5%
R630	22546104	100K ohm
R631	22545153	15K ohm, ±5%
R632	22546222	2.2K ohm
R633	22546392	3.9K ohm
R634	22545562	5.6K ohm, ±5%
R635	22545562	5.6K ohm, ±5%
R636	22563270	27 ohm Solid, ½W, ±10%
		CAPACITORS
C001	22445101	Electrolytic, 100mfd, 16WV
C002	22373822	Mylar, 0.0082mfd, M
C003	22445479	Electrolytic, 4.7mfd, 16WV
C004	22457102	Electrolytic, 1000mfd, 35WV
C601	22445470	Electrolytic, 47mfd, 16WV
C602	22372473	Mylar, 0.047mfd, K
C603	22373102	Mylar, 0.001mfd, M
C604	22445470	Electrolytic, 47mfd, 16WV
C605	22373472	Mylar, 0.0047mfd, M
C606	22372473	Mylar, 0.047mfd, K
C607	22440043	Electrolytic, 4.7mfd, 16WV
C608	22445100	Electrolytic, 10mfd, 16WV
C609	22445221	Electrolytic, 220mfd, 16WV
		ELECTRICAL PARTS
	22161094	Terminal, Pin
	22161259	Lug Terminal

Key No.	Part No.	Description
	38013110	Insulating Washer
	20881718	Insulating Spacer
	22748556	Radiator
	22754748	Holder, Varistor
		POWER SUPPLY SECTION
	22143402	Power Supply P.C. Board Assembly
		SEMICONDUCTORS
D701		Diode, 1S1885
D702		Diode, 1S1885
D703		Diode, 1S1885
D704		Diode, 1S1885
		RESISTORS *
R701	22563100	10 ohm, Solid, ½W, ±10%
R702	22563100	3 ohm, Solid, ½W, ±10%
		CAPACITORS
C701	22420107	Electrolytic, 100mfd, 80WV
C702	22403033	Electrolytic, 33mfd, 50WV
C703	22403032	Electrolytic, 15mfd, 50WV
C704	22330112	Paper, 0.01, M, 250V, AC
		ELECTRICAL PARTS
	22148400	Relay
	22165047	Fuse Holder
	22144197	Fuse, 1.6A
	22144193	Fuse, 800mA SLOW
		SPEED INDICATOR UNIT
	22130260	Speed Indicator P.C. Board Assembly
		SEMICONDUCTORS
IC801	22114289	IC, LD3200
IC802	22114289	IC, LD3200
IC803		IC, TC7400P
TR801	22114294	Transistor, 2SC536-G
TR802	22114294	Transistor, 2SC536-G
TR803		Transistor, 2SA562-O
TR804		Transistor, 2SC372-O
TR805		Transistor, 2SA562-O
TR806		Transistor, 2SA562-O
TR851		Transistor, 2SA562-Y
TR852		Transistor, 2SA562-Y
TR853		Transistor, 2SC735-GR
TR854		Transistor, 2SC735-GR
D801		Diode, 1S1555
D802		Diode, 1N60
D851		Diode, 1N60
D852		Diode, 1S1555

Key No.	Part No.	Description
D853	37246700	Diode, 1S1555
D854	37246700	Diode, 1S1555
D855	37246700	Diode, 1S1555
		RESISTORS
VR801	22658278	Semi-Fixed Resistor, 20K ohm (Lamp Adjusting)
VR802	22658278	Semi-Fixed Resistor, 20K ohm (Lamp Adjusting)
VR851	22658277	Semi-Fixed Resistor, 10K ohm (Speed Adjusting)
VR852	22658277	Semi-Fixed Resistor, 10K ohm (Speed Adjusting)
R801	22546273	27K ohm
R802	22546152	1.5K ohm
R803	22546152	1.5K ohm
R804	22546473	47K ohm
R805	22546562	5.6K ohm
R806	22546562	5.6K ohm
R807	22546392	3.9K ohm
R808	22546473	47K ohm
R809	22546103	10K ohm
R810	22546682	6.8K ohm
R811	22546273	27K ohm
R812	22546222	2.2K ohm
R813	22546153	15K ohm
R814	22546821	820 ohm
R815	22546473	47K ohm
R816	22546103	10K ohm
R817	22546273	27K ohm
R818	22546222	2.2K ohm
R819	22546682	6.8K ohm
R820	22546273	27K ohm
R821	22546101	100 ohm
R822	22546473	47K ohm
R823	22546101	100 ohm
R824	22546101	100 ohm
R850	22512333	33K ohm
R851	22512333	33K ohm
R852	22563101	100 ohm, Solid, ½W, ±10%
R853	22512562	5.6K ohm
R854	22563101	100 ohm, Solid, ½W, ±10%
R855	22512562	5.6K ohm
R856	22512333	33K ohm
R857	22563106	10M ohm, Solid, ½W, ±10%
R858	22512105	1M ohm
R859	22563106	10M ohm, Solid, ½W, ±10%
R860	22512105	1M ohm
R861	22563106	10M ohm, Solid, ½W, ±10%
R862	22512103	10K ohm
R863	22512153	15K ohm

*** All resistors are 1/4W, ±10%, carbon Resistor unless otherwise noted.**

Key No.	Part No.	Description
		CAPACITORS
C801	22445479	Electrolytic, 4.7mfd, 16WV
C802	22445479	Electrolytic, 4.7mfd, 16WV
C803	22445229	Electrolytic, 2.2mfd, 16WV
C804	22373473	Mylar, 0.047mfd, M
C805	22445109	Electrolytic, 1mfd, 16WV
C806	22445109	Electrolytic, 1mfd, 16WV
C807		
C808		
C809	22373333	Mylar, 0.033mfd, M
C810		
C851	22373103	Mylar, 0.01mfd, M
		ELECTRICAL PART
	22113246	Pilot Lamp
NEON LAMP UNIT		
	22130261	Neon Lamp P.C. Board Assembly
		RESISTORS
R901	22546223	22K ohm
R902	22546223	22K ohm
		ELECTRICAL PART
	22113289	Neon Lamp
EQUALIZER AMPLIFIER UNIT		
	22136422	Equalizer Amplifier P.C. Board Assembly
		SEMICONDUCTORS
IC501		IC TA7122AP
IC502		IC TA7122AP
TR501		Transistor, 2SA493-Y
D501		Diode, 1S1885
D502		Diode, 1S1885
		RESISTORS *
VR501	22658267	Semi-Fixed Resistor, 20K ohm (Gain Adjusting)
VR502	22658267	Semi-Fixed Resistor, 20K ohm (Gain Adjusting)
R501	22542104	100K ohm, Low Noise Type
R502	22542104	100K ohm, Low Noise Type
R503	22542563	56K ohm, Low Noise Type
R504	22542823	82K ohm, Low Noise Type
R505	22542103	10K ohm, Low Noise Type
R506	22542153	15K ohm, Low Noise Type
R507	22542824	820K ohm, Low Noise Type
R508	22542824	820K ohm, Low Noise Type
R509	22542333	33K ohm, Low Noise Type
R510	22542333	33K ohm, Low Noise Type
R511	22542332	3.3K ohm, Low Noise Type

Key No.	Part No.	Description
R512	22542332	3.3K ohm, Low Noise Type
R513	22542333	33K ohm, Low Noise Type
R514	22542333	33K ohm, Low Noise Type
R515	22542223	22K ohm, Low Noise Type
R516	22542223	22K ohm, Low Noise Type
R517	22542392	3.9K ohm,
R518	22542822	8.2K ohm,
R519	22542221	220 ohm,
R520	22542122	1.2K ohm,
		CAPACITORS
C501	22732223	Mylar, 0.022mfd, K
C502	22732223	Mylar, 0.022mfd, K
C503	22732332	Mylar, 0.0033mfd, K
C504	22732332	Mylar, 0.0033mfd, K
C505	22362470	Ceramic, 57PF, K
C506	22362470	Ceramic, 47PF, K
C507	22442471	Electrolytic, 470mfd, 6.3WV
C508	22442471	Electrolytic, 470mfd, 6.3WV
C509	22362470	Ceramic, 47PF, K
C510	22362470	Ceramic, 47PF, K
C511	22447479	Electrolytic, 4.7mfd, 35WV
C512	22447479	Electrolytic, 4.7mfd, 35WV
C513	22363471	Ceramic, 470PF, M
C514	22372224	Mylar, 0.22mfd, K
C515	22362391	Ceramic, 390PF, K
C516	22443221	Electrolytic, 220mfd, 10WV
C517	22447471	Electrolytic, 470mfd, 35WV
C518	22448471	Electrolytic, 470mfd, 50WV
C519	22448221	Electrolytic, 220mfd, 50WV
		ELECTRICAL PART
	22146055	Push Switch
MECHANICAL PARTS		
	20711660	Panel Assembly
	22865239	Nameplate, Speed Ind.
	22843890	Level
	22752794	Washer, Level
	22824551	Knob Ass'y, Volume
	22824541	Push Button
	22759507	Lever Ass'y, Power Switch
	22826529	Touch Button Ass'y
	22759508	Lamp Holder Ass'y
	22833703	Lens, Orange
	22752793	Washer, Lens
	22759509	Lamp Holder Ass'y
	25822644	Lens, Green
	25822645	Lens, Red
	22759510	Mirror Ass'y
	22754763	Neon Lamp Case
	22748592	Barrier, Neon Lamp
	22759511	Lamp Case Ass'y
	22759512	CdS Case Ass'y

Key No.	Part No.	Description
	22759513	Spacer Ass'y
	22125428	Motor Ass'y
	22740502	Plate, Slit
	20723673	Turntable
	20723030	Turntable Sheet Ass'y
	22184130	Cord Stopper
	20846608	Bottom Cover
	20791859	Washer, Clamp-Power Transformer
	22748587	Barrier, Power Switch
	20731710	Pickup Arm
	20781047	Cartridge, C-404SY
	20736025	Head Shell
	20738678	Pickup Arm Rest
	CABINET PARTS	
	20847699	Cabinet Ass'y
	22852563	Bottom Board
	22852564	Bottom Board
	22852568	Bottom Board
	22861516	Mark
	20836074	Nameplate, Cartridge Select
	20743818	Arm Base Ass'y
	22701537	Special Screw, Arm Base
	20791859	Washer, Arm Base
	22756748	Base Cushion
	20862697	Center Adaptor Holder
	22847507	Foot Ass'y
	20847700	Dust Cover Ass'y
	20746790	Support, Power Cord
	20881676	Stopper, Power Cord
	22842501	Bottom Cover
	ACCESSORIES	
	22166407	Connecting Cord
	22166226	Earth Cord
	20971656	Center Adaptor
	20971659	Screwdriver
	20971070	Stylus Cleaner
	20971071	Record Cleaner
	22952893	Owner's Manual
	ELECTRICAL PARTS	
	22162056	Output Terminal
	22146335	Micro Switch, Power
	22213652	Power Transformer
	22176286	Power Cord
	22113288	Pilot Lamp
	22161265	Lug Terminal
	22161211	Voltage Selecting Socket
	22164257	Voltage Selecting Plug
	20749672	Voltage Selector Cover